AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING

Civilian and Defense

OCTOBER 15, 1951

In This Issue . . .

Automotive Plant Expansions

Ross Hydrapower Steering Gear

Latest British Military Aircraft

Automatic Transmission Gears

New Equipment at Metal Exposition

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A CHILTON PUBLICATION

air superiority starts here

...where Heald's specialized engineering talent paves the way for faster, better production of aircraft parts

Any job is easier if you *know* how to do it. And when it comes to solving complex production problems — in any field — Heald engineers *do* know the answers. That's because Heald's staff of more than 200 trained engineers includes skilled specialists in every type of precision finishing.

If it's an aircraft production problem, for example, Heald's aircraft specialists make short work of it. But whatever the product, you can be sure that your precision finishing problems will get the benefit of the finest specialized engineering talent available anywhere. And that means faster, better production FOR YOU — through more efficient work setups on more efficient Heald machines.

HEALD
125 YEARS

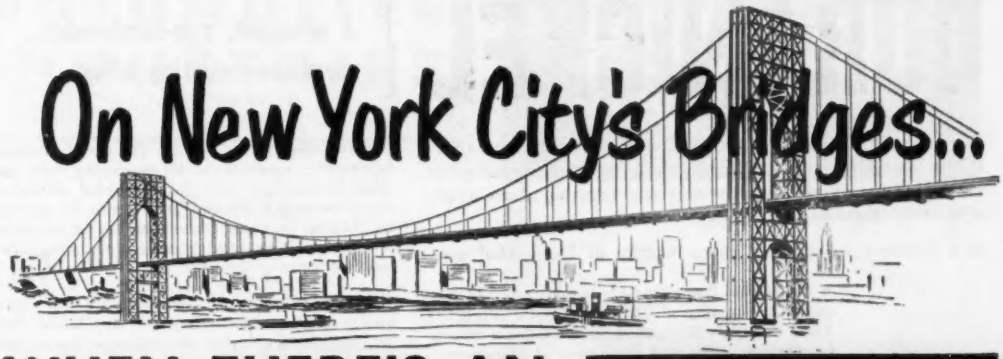
Heald precision speeds the nation's production

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

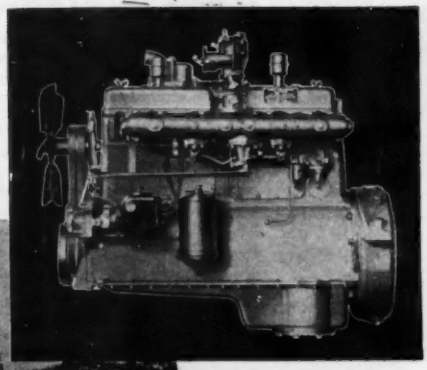
Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

On New York City's Bridges...



WHEN THERE'S AN EMERGENCY

Walter Wreckers get there fast



WAUKESHA
Model 140-GZB
HIGH OUTPUT
Six-Cylinder Engine
4⅛-in. bore x 5½-in. stroke, 554 cu. in. displ., 188 hp at 2600 rpm, powering Walter Wrecker owned by City of New York, Dept. of Public Works.

WAUKESHA ENGINES

● Traffic has to be kept moving all the time on New York City's bridges. An emergency that might impede traffic is handled promptly and efficiently. Waukesha engine powered—this Walter Four Point Positive Drive Wrecker darts away and speeds to the spot as swiftly as a fire engine.

With its 12-ton capacity, 42000 GVW, its hand hoist, power winches and other equipment, the Walter Wrecker is rugged and powerful enough to settle traffic troubles. And it has the Waukesha power plant to take it there and do it, dependably.

Built for the job, this six-cylinder Waukesha 140-GZB High Output Gasoline Engine develops 188 hp at 2600 rpm. It has a counterbalanced crankshaft, magneto ignition, downdraft carburetion, removable wet cylinder sleeves, Stellite-faced exhaust valves and exhaust valve inserts, arranged for full electrical equipment, air brake compressor and all modern accessories. Get the details. Send for Bulletin 1484. 129

WAUKESHA MOTOR COMPANY • WAUKESHA, WISCONSIN

NEW YORK TULSA LOS ANGELES

DURANICKEL

A wrought, age-hardenable, corrosion-resisting alloy

Duranickel® is a wrought, non-ferrous, slightly magnetic alloy. It has the higher strength found only in the heat-treated alloy steels, and not offered by other corrosion-resisting alloys available at comparable cost levels.

The principal engineering characteristics of Duranickel are:

● **Mechanical Properties:** The accompanying table shows the ranges of Ultimate Tensile Strength, Yield Strength, Elongation, and Hardness values for various forms and conditions of Duranickel.

● **Shear Strength:** Values for the ratio of maximum shearing strength to ultimate tensile strength range from approximately 0.5 to 0.6 and are comparable to those of mild and low-alloy steels.

● **Endurance Limit:** In rotating beam tests of polished specimens at room temperature and 10,000 rpm for 10^8 cycles, Duranickel hot-rolled showed an endurance limit of 51,000 psi.; hot-rolled, age-hardened showed 52,500 psi.; cold-drawn 51,000 psi.; and cold-drawn, age-hardened showed 61,000 psi.

● **Impact Strength:** Charpy impact strength ranges from 240 ft. lb. for hot-rolled Duranickel and 190 ft. lb. for cold-drawn, to 40 ft. lb., for the age-hardened condition.

● **Spring Properties:** Duranickel wire can be cold-drawn and age-hardened subsequently to develop tensile strength of the order of 225,000 psi. The torsional proportional limit of cold-drawn and age-hardened wire is about 40 per cent of the ultimate tensile strength. Duranickel springs are used at temperatures up to 550°F.; the stresses used should be governed by existing service conditions.

● **Working Characteristics:** Duranickel may be hot-worked, forged, and cold-worked. It can be machined most readily in the annealed condition and is commercially machinable in other conditions at hardnesses up to 275 BHN. The use of a cutting lubricant is essential for all machining work because Duranickel, like all high-nickel alloys, is characteristically "sticky" and tends to gall or build up on the tools. Duranickel can be joined by the usual welding, brazing and soft soldering processes common to industry.

● **Variants:** For special uses there are two alloys similar to Duranickel. They are: (1) Duranickel "R" containing a higher percentage of carbon for use where applications require optimum machinability. (2) Permanickel® having the same mechanical properties as Duranickel but different physical constants, particularly better electrical and thermal conductivity and stronger magnetic properties. Permanickel is preferred for service as springs requiring high electrical conductivity; equipment requiring good thermal conductivity and magnetostrictive units where high fatigue strength is required. Special applications include thermostat tension springs, reaction springs, clips, grid wires and side rods in vacuum tubes.

● **Corrosion Resistance:** The corrosion resistance of Duranickel in all its forms is of the same order as that of nickel to a wide variety of media, including mineral and organic acids, alkalies, salts, potable and industrial waters, food products, organic compounds and oxidizing atmospheres at normal and elevated temperatures.

● **Forms Produced:** Duranickel is supplied in most commonly used mill forms—rods, hexagons, squares, rounds, flats, strip, sheet, wire and welding materials.

● **Applications:** Duranickel is used in many applications where corrosion resistance, high hardness, and great strength are required. In the production of plastics, Duranickel is a standard material for dies, injection cylinders and extrusion screws. Duranickel springs, from both wire and strip, give excellent service. Instrument parts include diaphragms, bellows, flapper valve discs, snap switch blades, and grid wires and side rods in vacuum tubes.

Mechanical Property Ranges of Duranickel

Form and Condition	Tensile Strength 1000 psi.	Yield Strength (0.2% offset) 1000 psi.	Elongation in 2 in. per cent	Hardness Rockwell C
Rod and Bar				
Hot-finished	90-130	35-90	55-30	75B-22
Hot-finished, age-hardened	160-200	115-150	30-15	32-42
Cold-drawn, as-drawn	110-150	60-130	35-15	90B-32
Cold-drawn, age-hardened	170-210	125-175	25-15	32-42
Strip				
½ hard	130-155	.....	15-3	25-34
½ hard, age-hardened	170-210	.....	20-7	33-42
Spring	155-190	.....	10-2	30-40
Spring, age-hardened	180-230	.....	15-5	36-46
Wire				
Spring	160-200	.....	5-2	.....
Spring, age-hardened	200-240	.....	10-5	.....

FURTHER DATA AVAILABLE

A 22-page reference manual, ***Engineering Properties of Duranickel***, Technical Bulletin T-32, contains all essential engineering information. It is available, free, for your files.

Nickel alloys are being increasingly diverted to defense applications. However, technical help for metal problems involving corrosion, high temperatures or fatigue is available from INCO's Technical Service, either for immediate defense needs or for future installations.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

INCO Nickel Alloys

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

October 15, 1951 Vol. 105, No. 8

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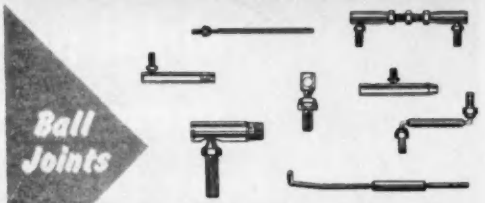
TOUREK

BALL JOINTS, PIPE PLUGS AND QUALITY SCREW MACHINE PRODUCTS



Ball Joints

• The use of Tourek Ball Joints — the only recognized standard — frequently brings about simplified design, improved performance and lower costs. A wide range of standard types is carried in stock to assure prompt delivery.

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• Accuracy, high strength and economy are yours by specifying Tourek precision countersunk pipe plugs. You get these advantages at costs which are competitive to old style plugs. Stock sizes, available with National Pipe or Dry-Seal threads are: ¼", ⅜", ½", ¾" and 1". Also available on special order in alloy steels, aluminum or brass in sizes up to 2¾" diameter.

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• The Tourek plant is one of the largest and most modern in this field. It is equipped with the latest in high speed single and 6-spindle automatics, as well as complete secondary equipment including grinding and brazing. These production facilities — backed by 30 years' experience, assure you "The Best In Quality Screw Machine Products."

Depend upon Tourek for your screw machine product needs, in sizes up to 2¾".

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TOUREK

"THE BEST IN QUALITY SCREW MACHINE PRODUCTS"

ESTABLISHED IN 1920

AUTOMOTIVE INDUSTRIES, Vol. 105, No. 8. Published semi-monthly by Chilton Co., Chestnut & 56th Sts., Phila. 39. Entered as Second Class Matter October 1, 1928, at the Post Office at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. In case of Non-Delivery Return Postage Guaranteed. Subscription price: United States, Mexico, United States Possessions, and all Latin-American countries, 1 year $2.00, 2 years $3.00. Canadian and Foreign $5.00 per year; single copies, 25 cents, except Statistical Issue (Mar. 15th), $1.00.

NEW Pangborn Continuous-Flo ROTOBLAST* BARREL installed in another automobile plant

Initial performance shows 59% saving over former cleaning method

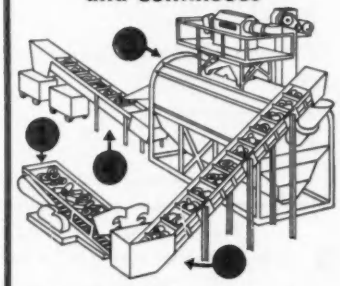
EARLY reports from one of America's foremost automobile makers show its new Pangborn *Continuous-Flo* ROTO-BLAST Barrel increases production and reduces costs. Forgings are cleaned at a *59% saving* over pickling . . . including all costs for materials, maintenance, power and labor!

Labor costs are down because manual handling is eliminated. Cleaning has been stepped up to an average rate of 12 tons per hour . . . 17 tons an hour on some forgings. And a public relations problem has been solved because pickling acid no longer pollutes nearby streams.

GET THE FACTS ON PANGBORN ROTOBLAST. Whether you pickle or clean with multiple batch equipment or tumbling mills . . . Pangborn has a ROTOBLAST Machine to clean faster, better and cheaper. Bulletin 214 gives full details. For your free copy write: Pangborn Corp., 3900 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

Operation is Automatic and Continuous



1. *Forgings are dumped from tubs onto an independent loading conveyor.*
2. *An integral flight conveyor feeds forgings to Barrel at an even rate.*
3. *Work moves continuously through Barrel while being cleaned by two ROTO-BLAST streams.*
4. *Forgings are discharged from Barrel to tubs by automatic conveyor. No manual handling is necessary.*

*TRADEMARK OF PANGBORN CORPORATION

Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job

THE NEW

Polyken®

INDUSTRIAL TAPES

TAILORED TO YOUR JOB

Tape controls pull of 14,500 pound-seconds in JATO unit with Polyken Tape No. 276. Picture taken at the Aerojet Engineering Corp.

Tape holds 18 times the force of gravity

Jet-assisted take-off gets planes air-borne in half the distance it used to take with propellers alone. But when the Aerojet Engineering Corp. first introduced its JATO (Jet-Assisted Take-Off) unit to aircraft, the terrific jet thrust tended to rip the unit apart—to rip the charge loose from its shell.

Aerojet engineers consulted with a Polyken Sales Engineer, who suggested Polyken No. 276—a Fiberglas*-backed tape—to bind the plug and cap assembly that secures the charge to the shell.

Polyken No. 276, strong enough to resist a pull of 14,500 pound-seconds (or 18 times the force of gravity), is strong enough to keep the charge from moving rearward when the powerful energy thrust occurs.

We tell you the JATO story as an example of how industrial tape that's "tailored to your job" can do things you never thought tape could do. Let us study *your* problem, and we'll come up with a tape that will save you money, time and effort. That's a challenge. Won't you take us up on it?

Polyken Industrial Tape, Department of Bauer & Black, Division of The Kendall Company

*Reg. U. S. Pat. Off. by Owens Corning Fiberglas Corp.

Polyken, Dept. AIK-2, 222 West Adams St., Chicago 6, Ill.

For specifications and further information on this and other Polyken tapes, please send me your *FREE BOOKLET*, "Tape is a Tool."

Name_____ Title_____

Company_____

Street Address_____

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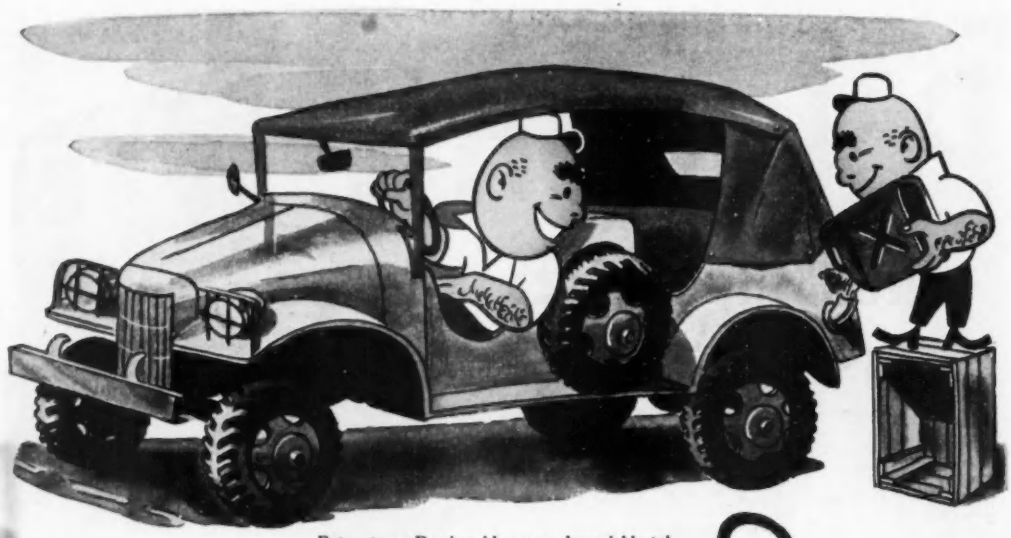
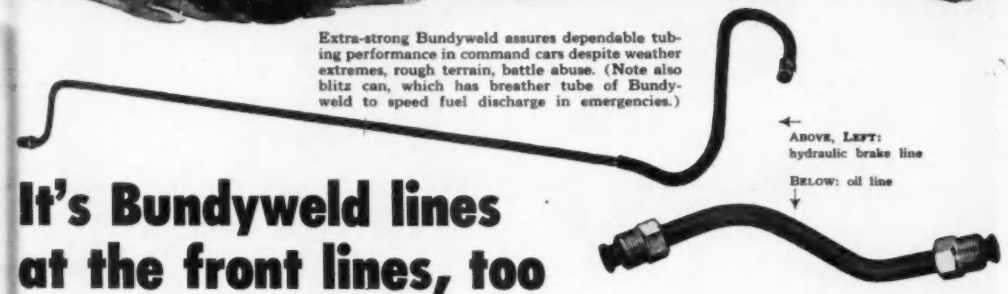


Extra-strong Bundyweld assures dependable tubing performance in command cars despite weather extremes, rough terrain, battle abuse. (Note also blitz can, which has breather tube of Bundyweld to speed fuel discharge in emergencies.)



ABOVE, LEFT: hydraulic brake line

BELOW: oil line

It's Bundyweld lines at the front lines, too

Top automotive tubing for twenty-five years, Bundyweld performs better in vital fuel, oil, brake, and hydraulic lines of army vehicles, too. Bundyweld takes more vibration, more pressure. It withstands the shock of jolts and jars. It won't leak.

Bundyweld fabricates better, too —comes to you scale-free, held to close tolerances, smooth and clean inside and out. It machines in almost any way, bends easily to short radii without weakening.

Bundyweld is the only tubing double-walled from a single strip, with a patented beveled seam-edge. It's copper-brazed through 360° of wall contact into a safer, stronger, solid-wall tube. For more information, or for help in solving bending problems, write today. ***Bundy Tubing Company, Detroit 14, Mich.***

Bundyweld® Tubing

DOUBLE-WALLED FROM A SINGLE STRIP

WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of basic metal, coated with a bonding metal. Then it's . . . continuously rolled twice around laterally into a tube of uniform thickness, and passed through a furnace. Bonding metal fuses with basic metal, presto— Bundyweld . . . double-walled and brazed through 360° of wall contact.

NOTE the exclusive patented Bundyweld beveled edge, which affords a smoother joint, absence of bead and less chance for any leakage.

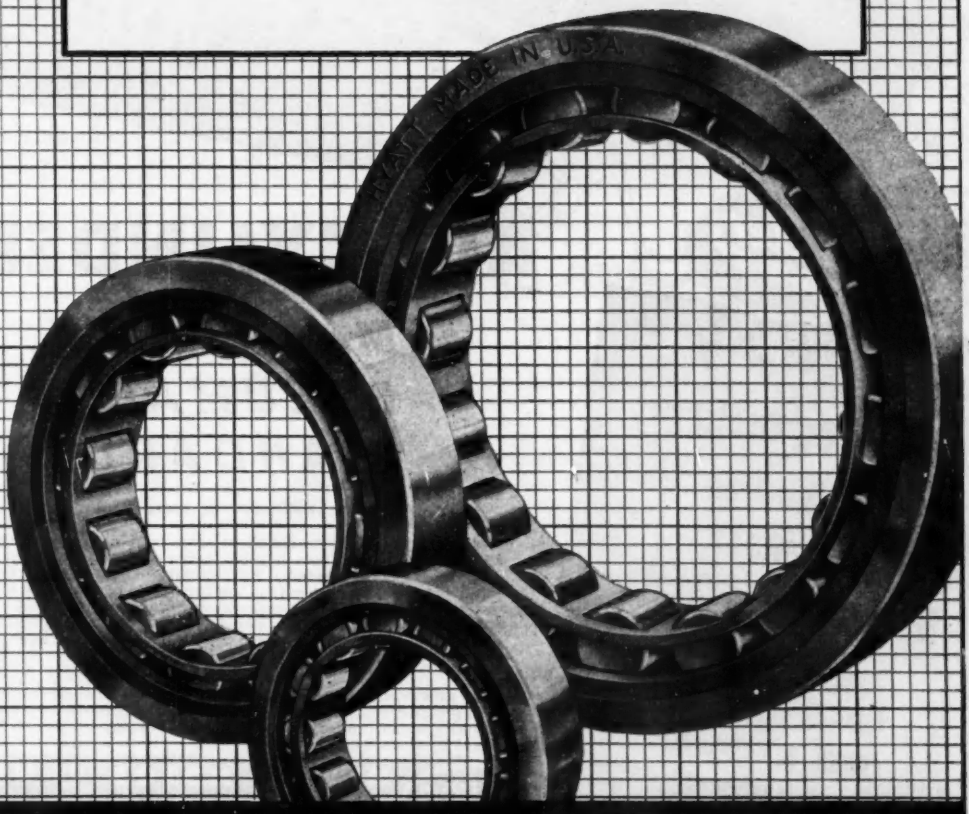
Bundy Tubing Distributors and Representatives: Cambridge 42, Mass.: Austin-Hastings Co., Inc., 226 Binney St. • **Chattanooga 2, Tenn.:** Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • **Chicago 32, Ill.:** Lapham-Hickey Co., 3333 W. 47th Place • **Elizabeth, New Jersey:** A. B. Murray Co., Inc., Post Office Box 476 • **Philadelphia 3, Penn.:** Rutan & Co., 1717 Sansom St. • **San Francisco 10, Calif.:** Pacific Metals Co., Ltd., 3100 19th St. • **Seattle 4, Wash.:** Eagle Metals Co., 4755 First Ave. South **Toronto 5, Ontario, Canada:** Alloy Metal Sales, Ltd., 881 Bay St. • Bundyweld nickel and Monel tubing is sold by distributors of nickel and nickel alloys in principal cities.

There's a correctly designed HYATT *for each application*

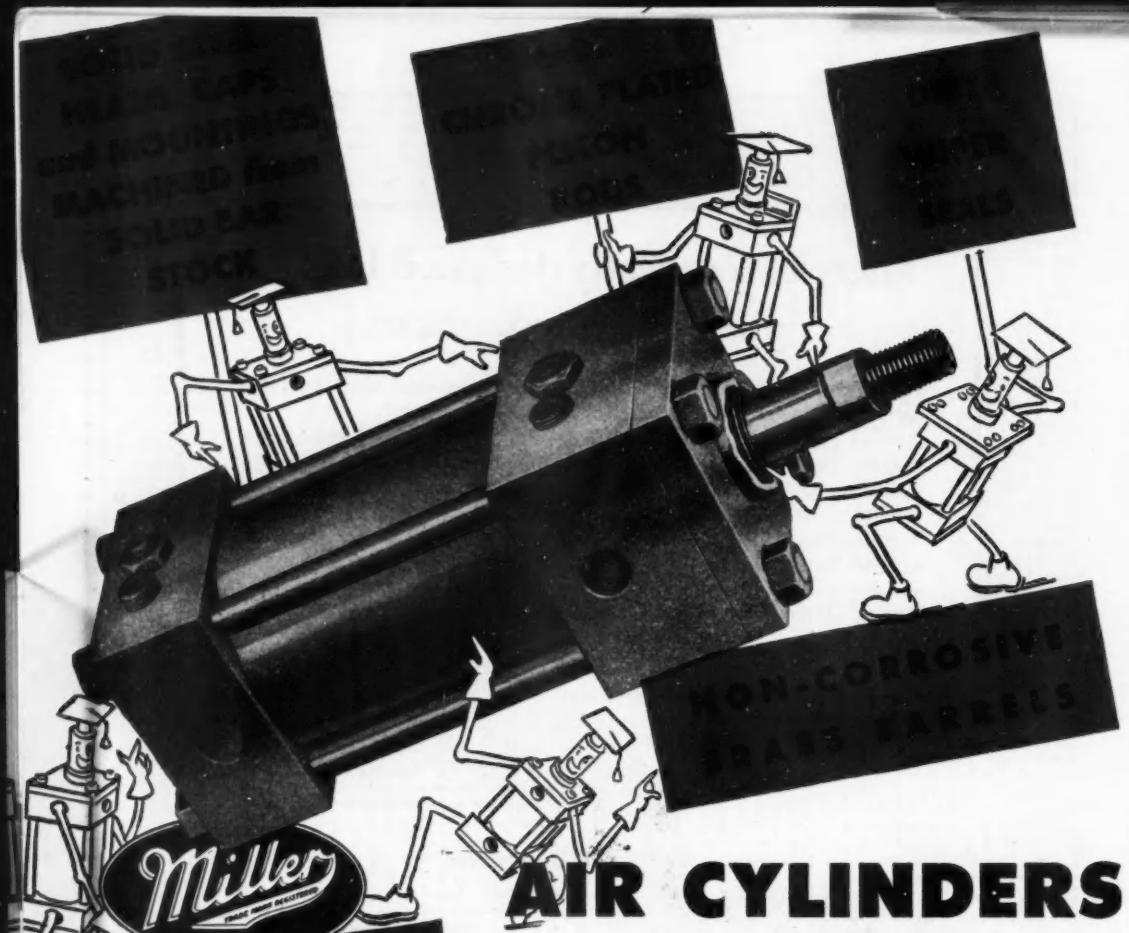
Hyatt Bearings are available in a wide range of sizes and types, each one being suitable for specific operating conditions.

Long experience in the manufacture and application of anti-friction bearings for an impressive variety of automotive applications has developed among Hyatt engineers a recognized ability to help you design just the right bearing for each application.

If you would like more information about the various sizes and types of Hyatt Roller Bearings, or if you have a specific bearing application that you think we can help you with, just call or write Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.; Detroit, Michigan.



HYATT ROLLER BEARINGS



AIR CYLINDERS

Meet J. I. C. PNEUMATIC STANDARDS

(Write for FREE copy of these "Standards")

The four features illustrated above serve to show how Miller Air Cylinders *for years* have been meeting—*even exceeding*—the high quality set by the recently adopted J. I. C. Pneumatic Standards for Industrial Equipment. See for yourself! . . . write for our free bulletin A-105 and receive also your own *free* personal unabridged copy of these "Standards" with standard symbols, sample circuit, interesting point-by-point comparison—all neatly compiled into a handy booklet that fits your reference file and folds to fit your pocket.

COMPLETE MILLER CYLINDER LINE INCLUDES: AIR CYLINDERS, 1½" to 20" BORES, 200 PSI OPERATION; LOW PRESSURE HYDRAULIC CYLINDERS, 1½" TO 6" BORES FOR 500 PSI OPERATION, 8" TO 14" BORES FOR 250 PSI; HIGH PRESSURE HYDRAULIC CYLINDERS, 1½" TO 12" BORES, 2000-3000 PSI OPERATION. ALL MOUNTING STYLES AVAILABLE.

MILLER MOTOR COMPANY

2028 N. HAWTHORNE, MELROSE PARK, ILLINOIS

AIR AND HYDRAULIC CYLINDERS · ACCUMULATORS · COUNTERBALANCE CYLINDERS · BOOSTERS · AIR HOISTS

CLEVELAND — PITTSBURGH — PHILADELPHIA — DETROIT — YOUNGSTOWN — BOSTON
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Sales and Service from coast to coast

Steering AT ITS BEST

MARMON-HERRINGTON MODEL TC-48 FOR DENVER TRAMWAY CORP.

ROSS BRINGS EASE . . . AND ECONOMY

UNUSUAL STRENGTH, sturdiness and safety because of "box girder" principle of body design and construction . . . *New passenger comfort*—wide aisles and doors—good seat spacing—controlled heat and ventilation . . . *New driver satisfaction*—raised platform—exceptional vision—built-in barrier—independent heat . . . All these are outstanding advantages of MARMON-HERRINGTON Model TC-48 . . . *plus the finest in Steering—ROSS.*

The Ross policy of incorporating advancements in design as they are proved by exhaustive tests has resulted in many recent improvements. Current Ross models have:

(1) ***Increased mechanical reduction*** . . . (2) ***More compactness*** . . . (3) ***Reduction in weight*** . . . (4) ***Greater arm angular-travel*** . . . (5) ***Improved metallurgy*** . . . (6) ***Increased efficiency.***

Throughout 44 years of leadership in this industry, Ross gears have been distinguished for long life, simplicity of adjustment and maintenance of long-recognized qualities of safety, stability and performance. We invite discussion of any steering problem.

Ross

Cam & Lever **STEERING**

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

applications unlimited

There is almost no limit to the number of ways Western Felts are serving today. Technical design and production specialists for decades have been in close cooperation with manufacturers of products employing felts for such purposes as absorbing vibration, retaining lubricants, excluding dust and grit, filtering gases and liquids, controlling temperatures and sound, firming and lining apparel, covering furniture, clothing people; for padding, packing, sealing, grinding, polishing, etc. It can be made waterproof and fungus-proof and flame resistant. It will pay you to place your felt requirements in the experienced hands of Western Felt. Its counsel and products will prove profitable. In whatever way you use it, Western Felt will add materially to improving your product. Insist upon WESTERN FELTS!

WESTERN Felt WORKS

4035-4117 Ogden Avenue Chicago 23, Illinois

MANUFACTURERS AND CUTTERS OF WOOL FELTS

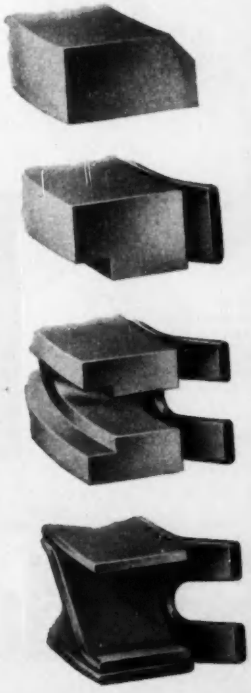
"Made for Each Other!"

SERVICE PISTON RING SETS BY MUSKEGON

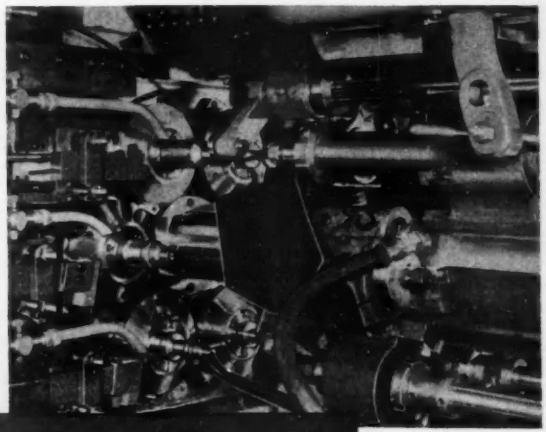
Muskegon works with engine builders to design piston rings especially for their specific engines. Thus each ring and its companion rings, each set of rings and its corresponding engine are indeed "made for each other" and work together to achieve the very maximum of performance, mileage, and economy.

Furthermore, Muskegon's facilities for the casting, processing, finishing, inspection, and packaging of these Service Piston Ring Sets are unparalleled.

These *Factory Approved* and *Factory Engineered* Service Piston Ring Sets are available from your car dealer or other authorized service outlets.



MUSKEGON
Piston Rings
MUSKEGON PISTON RING CO.
MUSKEGON, MICHIGAN
PLANTS AT MUSKEGON AND SPARTA
"THE ENGINE BUILDERS' SOURCE"



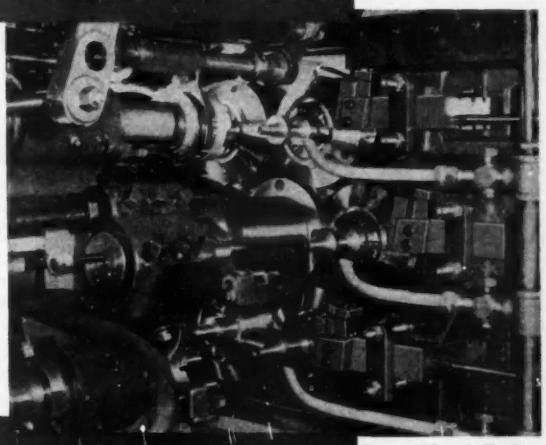
Front Side of Tooling Area 1-5/8-SIX

THE FACILITY BEHIND THE NEWS

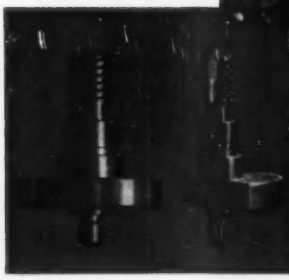
Case histories have appeal, whether they're about someone's time being bettered at a lathe or at an altar. Success likes success, and "misery likes company."

An "automatic's" case history is just an *end* of a *means* of machining facility. If you procure the right facilities, good case histories will result in *your* plant.

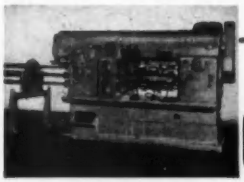
When selecting the best multi-spindle automatic facility for *your* needs, you will want to compare *all brands*. But you should have *full* information for a thorough comparison. You can have it on CONOMATICS.



Rear Side of Tooling Area 1-5/8-SIX



Cross drilling, cross milling, end broaching, end milling, and sawing operations are commonly performed by stopping the work spindles—often a costly procedure. For certain requirements, such as for the broached hole in the piece shown, CONOMATICS have performed all of the operations mentioned without stopping the work spindles.

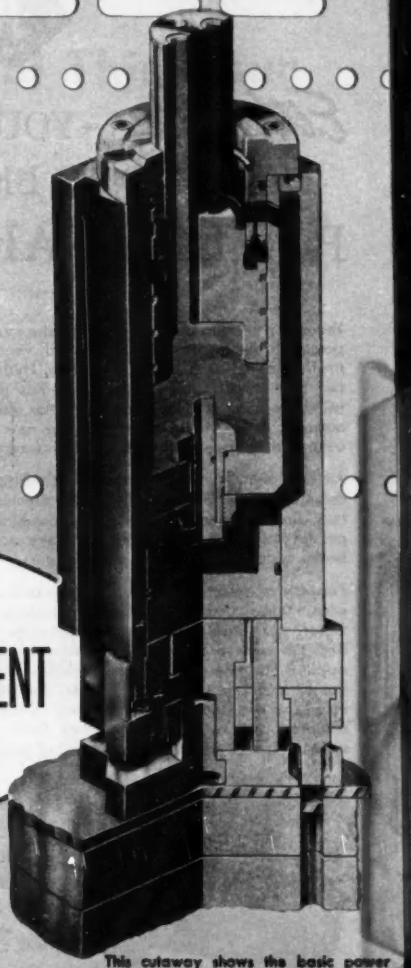


A Comparison of ALL Automatics is in favor of Cone

Conomatic } **CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.**

NOW- GET COSTS OUT OF THE HOLES!

The compactness of the basic actuating cylinder makes it possible to arrange these units at any angle in fairly confined areas. Below, all required holes are pierced in an automotive frame side member in one simple operation.



This cutaway shows the basic power cylinder of these hydraulic machines after the hole is pierced and stripping is completed. Stripping and blankholding are entirely automatic, requiring no springs or additional valves, thus simplifying construction.

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Presents a Complete Line of

HYDRAULIC METALWORKING EQUIPMENT

With Built-in Blankholding and Stripping Action

Save man-hours, floor space and equipment. Built under Mueller Patents, these machines provide a means to pierce holes, extrude holes for rivets, trim or rivet at any angle. All operations can be done on irregularly shaped parts and in fairly confined areas. Built-in stripping and blankholding action eliminates springs, extra valves, or other such devices, resulting in greater flexibility of arrangement.

Smooth hydraulic action and extra rigidity inherent in this construction makes it possible to pierce holes smaller in diameter than the thickness of the metal economically—or even to pierce holes in heat treated high carbon steel.

Danly engineers will design the equipment from your piecepart drawings. Danly proposals will include holding fixtures and complete tooling if desired. Phone or write for additional information today.

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Either Way – YOU'RE ON THE ROAD TO BETTER POWER BRAKING!

There's no need to be puzzled about the question of efficient power braking for *any* commercial vehicle. Where the preference is for a hydraulic system, Hydrovac, with over two and a half million installations, has proven itself the undisputed leader in its field. And for vehicles where air actuated brakes are the choice, the new Bendix Air-Pak air-hydraulic power braking unit is foremost in its field.

Air-Pak, similar in design and principle to the Hydrovac, changes air pressure into hydraulic pressure by means of two direct connected pistons, thus combining all the well proven advantages of hydraulic brake action with an air brake system.

Products of twenty-five years of practical braking experience, these outstanding power braking systems offer faster, more positive and better controlled braking. And in both the vacuum and the air actuated units, brakes can be applied instantly by foot power alone—a safety factor of tremendous importance. Remember, regardless of size of vehicle or whether your preference is for vacuum or air actuated brakes, for the industry's finest power braking systems—specify Bendix® Hydrovac® or Bendix Air-Pak.

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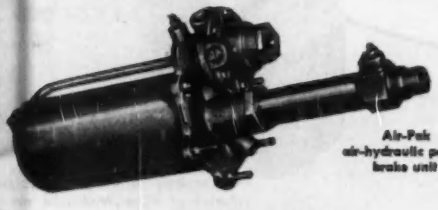
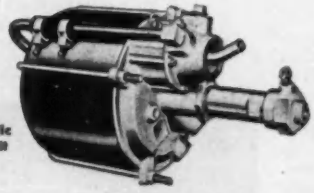


Air-Pak
air-hydraulic power
brake unit



Hydrovac
vacuum-hydraulic
power brake unit

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High Spots of This Issue

National Metal Show

This issue brings highlights of the ambitious program scheduled for the Thirty-Third National Metal Congress and Exposition now in progress at Detroit. Additionally, new products and equipment exhibited there are succinctly described and illustrated. Pages 50 and 51.

Vast Automotive Plant Expansion for Defense

In the current plan to superimpose a military production program on top of a civilian economy the automotive companies are in process of a sizeable expansion. Here revealed are results at Ford, General Motors, Chrysler, Packard, Willys, K-F and Nash. Page 32.

Ford's Automatic Transmission

The manufacture of precision gears and pinions for the Ford-Mercury automatic transmission is notably painstaking. This fifth article in the current Ford series stresses the high degree of quality control maintained in making four selected gears. See page 34.

Hydrapower Steering

A newly designed power steering developed by the Ross Gear and Tool Co. is being supplied to Armed Forces vehicles as well as to those for commercial use. There is claimed to be no lag in hydraulic response. Page 39.

Latest British Aircraft and Engines

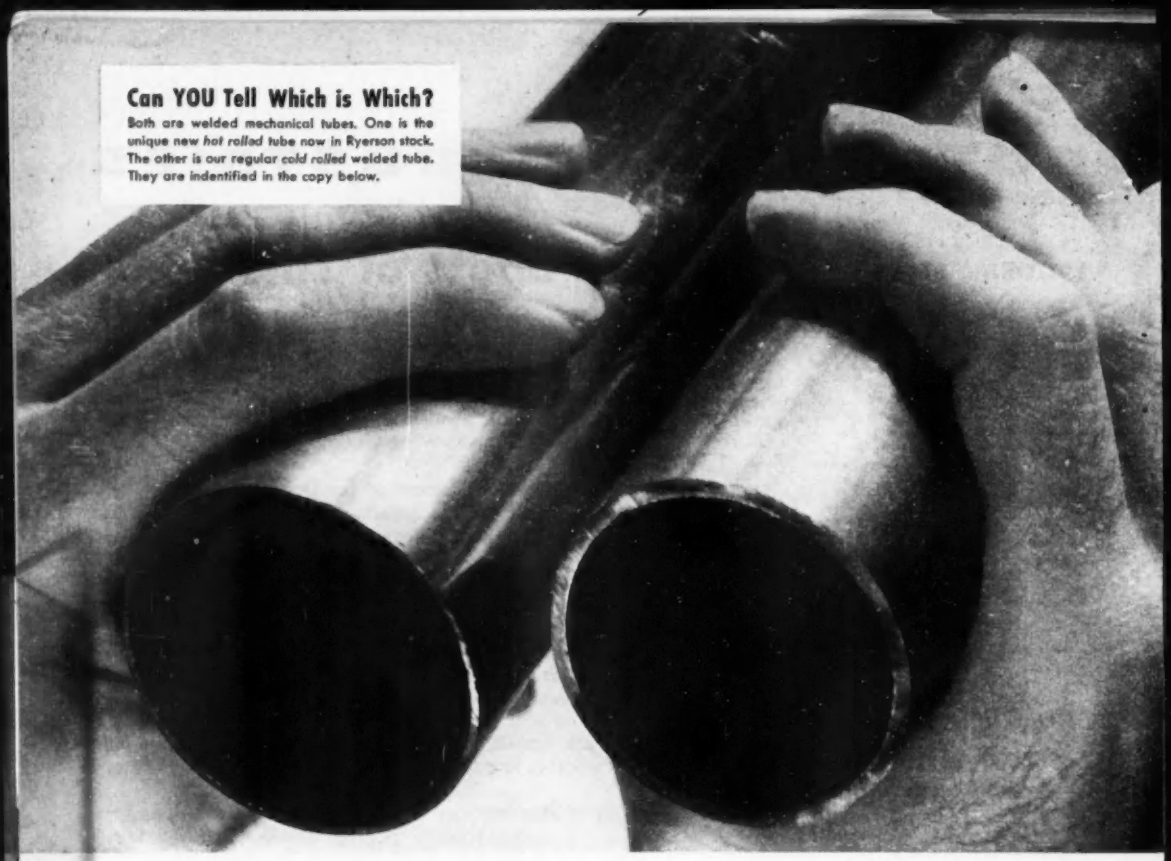
At the Farnborough Show in September, 60 countries were represented when British aircraft manufacturers staged their annual exhibition and flying display. W. F. Bradley, Special European Correspondent for AUTOMOTIVE INDUSTRIES, gives a first-hand report. Page 42.

37 New Products Items And Other High Spots, Such As:

Spain's plans for greater automobile production; American sports cars winning of the Watkins Glen grand prix; the need for Salesmanship in renegotiation; Metals; the Business Pulse; new Defense facilities and Defense contract awards; and news of the machinery industries.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT


Can YOU Tell Which is Which?
Both are welded mechanical tubes. One is the unique new *hot rolled* tube now in Ryerson stock. The other is our regular *cold rolled* welded tube. They are indentified in the copy below.

New Stock of Hot Rolled Welded Mechanical Tubing

We are happy to offer a new Ryerson product—*hot rolled* welded mechanical tubing with a finish which is far superior to that of the usual hot rolled product. In the unretouched photograph above, this new tube is on the right.

The tube on the left is from our regular stock of *cold rolled* welded mechanical tubing. Both hot and cold rolled are in good supply at Ryerson. So you can get immediate shipment of either one in a wide range of round and square sizes.

Of course the cold rolled tube must be used for most plating and all applications which require an *extra* bright, smooth finish. But, in some other applications, our hot rolled welded tubing can be substituted — at considerable saving. Its finish is that good.

For example, the hot rolled needs no surface preparation to take paint better than the cold rolled.

The convenience of fast, accurate cutting service is always available at your nearby Ryerson plant. And Ryerson tubing specialists will gladly work with you on any tubing problem. So call us for welded tubing, now in good supply, as well as for other tubing requirements.

PRINCIPAL PRODUCTS

CARBON STEEL BARS—Hot rolled and cold finished
STRUCTURALS—Channels, angles, beams, etc.
PLATES—Many types including Inland 4-Way Safety Plate
SHEETS—Hot and cold rolled, many types and coatings
TUBING—Seamless and welded, mechanical and boiler tubes
ALLOYS—Hot rolled, cold finished, heat treated.
STAINLESS—Allegheny bars, plates, sheets, tubes, etc.
MACHINERY & TOOLS—For metal fabrication

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND
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News of the AUTOMOTIVE INDUSTRIES

Vol. 105, No. 8 October 15, 1951

65 Million Vehicles Seen by 1960

If no more progress on highways and parking areas is made in the next 10 years than has been made in the last decade, and if predictions of automobile population 10 years from now, made by James J. Newman, vice president of B. F. Goodrich, materializes, the traffic snarl will present an impossible situation. Mr. Newman estimates that by the end of 1960 there will be 65 million passenger cars and trucks on the road provided there is no all-out war. He also predicts that public demand will force construction of more highways and more parking area.

Car Builders to Help Build Machines

Plans are moving ahead for automobile companies to take on machine tool work to help relieve the critical shortage of such equipment. Only one or two of the very largest companies will attempt assembly of complete tools with the rest of the industry acting as suppliers of sub-assemblies and giving assistance in lining up their own suppliers to make machine tool components.

Budd Building New $6 Million Plant

The Budd Co. has started construction of a new plant in Philadelphia to machine, weld and paint tank hulls and turrets for the Army under a subcontract from the Chyrsler Corp. Cost of the project including machinery is $6 million. Completion of the building, including installation of much of the machinery, is scheduled for March, 1952. The two-story structure will be erected adjacent to Budd's present automobile body components plant.

Big Chevrolet Expansion Now Underway

The $20.8 million expansion of Chevrolet's Town of Tonawanda, N. Y., facilities is now underway. The John W. Cowper Co., Inc., has been awarded the contracts for the foundation work, and power shovels are on the site. The dollar amount involved in the Cowper contract was not made known, but was said to exceed $1 million. The Buffalo contracting and engineering firm will put in the foundations for the main addition to the existing plant. The new structure will cover 360,000 sq ft and will rise in the rear of the plant fronting on River Rd.

Willys Has Agreement With Canada and Ford of Canada

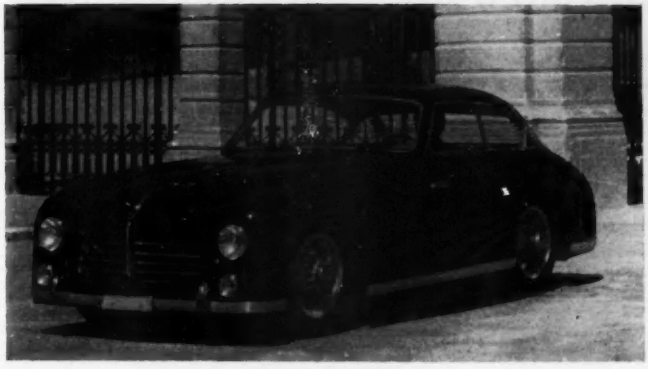
Willys-Overland Motors, Inc., has disclosed a three-way cooperative agreement between Canada and Ford Motor Co. of Canada, Ltd., for the production in Canada of quarter-ton four-by-four military trucks for the exclusive use of the Canadian military forces and having the same specifications as the vehicles built by Willys under its trade name, "Jeep." Under the agreement Willys-Overland will assist Ford of Canada to tool up for production by furnishing blueprints, engineering information, technical assistance and the right to use Willys patents. Willys will also cooperate by supplying parts for assembly of the vehicles from its sources in the United States until such time as Ford of Canada may establish Canadian facilities for making these parts. The agreement provides for Willys to receive a specified remuneration per vehicle built.

Truck Output May Set New Record This Year

If materials are available to build the 256,000 trucks allotted by NPA for the last quarter of this year the industry will ring up a new all-time record in 1951. Estimated production by the end of September was 1,130,000, and an average of only 82,000 trucks a month in the last quarter of this year will equal the 1948 record of 1,376,000. Through the third quarter, truck output averaged about 115,000 units a month and production will have to fall off a lot more than the seven per cent cut by NPA to get down to anywhere near 82,000 a month. If the full 256,000 trucks are built, the year's total will top the previous record by 10,000. It should be remembered, of course, that 1951 production figures represent military as well as civilian trucks.

See Third Quarter Car Output Under NPA Quota

Unofficial estimates put production for the third quarter of this year about 25,000 cars short of the 1.2 million units permitted under NPA quotas. The deficit resulted from some of the independents not reaching their quotas because of labor troubles, materials shortages, or slow sales. There is some



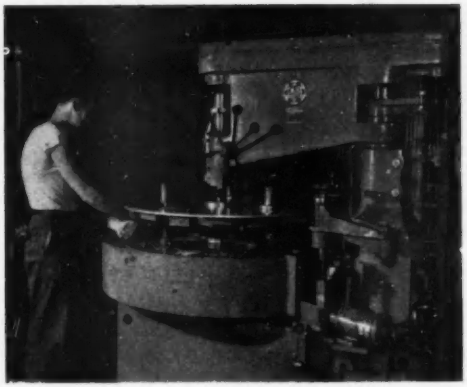
SPEED FROM SPAIN

This new automobile, the Pegaso 102, newly-announced by Empresa Nacional de Autocamiones, S. A., Barcelona, Spain, was shown at the Paris Automobile Show. Powered by a V-8 engine, the car is said to have a speed of over 120 mph.

doubt that the industry will be able to build the 1.1 million units allotted for the present quarter, but the deficit again is not expected to be very large.

Copper at the moment appears to be the most serious problem with steel plates also causing some concern. Other types of steel still are tight, but are not expected to be the limiting factor. The shortages started to catch up with the industry in the third quarter and are likely to be more restrictive in the months ahead. The industry came under the CMP program starting Oct. 1, but this is not expected to be of any particular help in finding the amount of materials allotted.

Even though military programs are not scheduled to get into production to any appreciable extent during the present quarter or even in the first quarter of next year, one factor that may affect the supply of materials for motor vehicles is that pipelines for military production programs will be filled ahead of actual production and may present quite a serious drain on the supply. The impact on civilian industry from this pipeline filling operation is likely to be felt more each succeeding quarter until about the middle of next year, at least. Nonetheless, the industry has unofficial information from Washington that passenger car allotments for the first quarter of 1952 will be about one million units. There have been several rumors that output might be restricted to as low as 800,000 units, but these have not had any confirmation as yet.



GETS THEM FLAT

One of the special problems in the machining of aluminum valve bodies for Ford-Mercury automatic transmissions at the Ford plant in Cincinnati is that of getting the faces perfectly flat and with fine surface finish. This view shows one of the battery of Micromatic Micro-Flat lapping machines employed for lapping such castings to a high degree of flatness. The operator may be seen holding one of the parts.

The picture at the moment is very much as it has been, namely, considerable confusion and uncertainty with no definite knowledge by anyone as to what industry will do in the months ahead. All companies, however, are proceeding on the basis that they will somehow find the materials to build up to or very near their allowable NPA production. An example of the confused thinking in Washington relates to the recent mixup over the use of chrome stainless steel for automotive trim. Apparently someone in NPA was confused between nickel bearing stainless steel and the straight chrome variety. Steel companies report there is no shortage of straight chrome stainless, and that there is no reason for its limitation for automotive use. So far as individual company allotments are concerned, they will remain unchanged until at least the beginning of the second quarter of 1952. At a meeting between automobile industry representatives and NPA, a revision of individual allotments to conform with a section of the Defense Production Act calling for consideration of current competitive positions was discussed, but was strenuously opposed by most of the smaller companies and the larger manufacturers agreed to stay with the present percentages for at least six months.

Meanwhile, new car sales have shown signs of improvement, with August registrations up slightly from July. Many industry officials believe that an unbalanced supply-demand situation is coming for automobiles before too long. Analysis of registration figures and factory sales for August would appear to bear out their conviction. AMA reports that August factory sales on passenger cars totaled 426,932 units, while Polk's estimates of registrations for the month total about 421,000. Since 22,342 new cars went into the export market during August, only 404,590 new cars were available for the domestic market or about 16,400 fewer than actually were sold.

General industry thinking is that automobile production next year will be about four million units and that demand will be about five million, so that a shortage will result. It now looks as though the industry this year will wind up with somewhere between 5.3 and 5.4 million cars, which will still make it the second best year on record. To drop back to third best year, production during the last quarter would have to fall

ACF-BRILL'S NEWEST

The ACF-Brill Motors Co.'s new model IC-41A intercity coach is powered by a six-cyl Hall-Scott engine developing 220 hp at 2200 rpm. This model has a 270 in. wheelbase, is 10 ft 2 in. in height, and 34 ft 11½ in. in length.

below 5.12 million, which does not seem likely unless some major obstacle, entirely unforeseen now, develops.

GMC Builds First New Army Truck

GMC Truck and Coach Div. of General Motors Corp. has turned out the first M-135 military truck under its government contract. The first production unit was built less than 10 months after the division received its letter contract.

USAF to Award Contracts for Interceptor Development

The U. S. Air Force will award contracts to Consolidated-Vultee Aircraft Corp. and Republic Aviation Corp. for further development of designs submitted for a new interceptor aircraft. Six aircraft manufacturers submitted a total of 12 designs for the preliminary evaluation studies conducted by the USAF. The development contracts will call for further elaboration on the designs submitted by the two firms, including the construction of mockups, models, and wind tunnel tests.

Pratt & Whitney Subcontract to Allis-Chalmers

A major subcontract to help build T-34 turboprop engines for new military aircraft has been let to Allis-Chalmers Manufacturing Co. of Milwaukee, Wisc., by Pratt & Whitney Aircraft Div. of United Aircraft Corp. The T-34 Turbo-Wasp gas turbine engine is reportedly one of the most powerful turboprop engines to reach the flight test stage in the United States and has ratings from 5000 to 6000hp.

B-W Division Gets Tank Parts Contract

Prime and subcontracts totaling $2,363,510 for the manufacture of parts for light and medium tanks have been awarded to the Memphis, Tenn., plant of Mechanics Universal Joint Div.—Borg-Warner Corp. The tank parts will be made in a new $3 million, 30,000-sq-ft plant already under construction on the Mechanics Div.'s 14½-acre site in Memphis. The new plant will be adjacent to another factory building which Mechanics opened early in 1948 for the manufacture of universal joints for the automobile industry.

Tank parts will be supplied to Ford, Chrysler, Fisher Body, Cadillac, International Harvester, Massey-Harris, Allis-Chalmers, American Car and Foundry, the Detroit Arsenal, American Locomotive, Pacific Car and Foundry, and Food Machinery Corp.

Detroit Tank Center Reorganizes Staff

Top level reorganization of the Army Ordnance Tank-Automotive Center has been started by Brig. Gen. C. H. Dietrick, who has succeeded Brig. Gen. David J. Crawford, who was removed from command following a congressional investigation. Col. A. R. Cyr has been named executive officer, a post equivalent to vice president in charge of operations in civilian organization. He graduated from West Point in 1933 and is also a graduate with a masters degree in business administration from Harvard Graduate School. New head of the Procurement Div. is Col. H. G. Davisson, also a West Pointer, and associated with the Ordnance Corps since 1940. He will be directly responsible to Gen. Dietrick for the Ordnance Corps multi-billion dollar procurement program. Col. Henry J. Katz has been appointed fiscal director, management director, and chief of a new audit section. He graduated from the military academy in 1936 and since 1938 has been with the Ordnance Corps. New chief of the Legal Div. will be Lt. Col. Vernon C. Rawls of the Army's Judge Advocate Office, who will pass on legality of all contracts.

Bohn to Run Air Force Aluminum Forge Plant

Bohn Aluminum and Brass Corp. has been awarded a contract to operate for the Air Force a government-owned aluminum and forging plant at Adrian, Mich. Most recent operator of the plant was Reynolds Metal Co. which was relieved of its contract after a labor dispute closed the plant for 11 weeks. Bohn operated the plant after it was built by the government during World War II, and it is understood that it will produce production parts for aircraft. Since the end of the war the Adrian plant has been used principally for experimental and development work.

Goodrich Head Urges More Rubber Plants

Synthetic rubber has come of age and a large world market exists for it, according to P. W. Litchfield, board chairman of Goodyear. As a result, he said that there would be a large market for the American product if this country had extra capacity for production and no further stockpiling requirements. He recommends that another 220,000 tons of capacity for petroleum base synthetic rubber production be created to replace the present alcohol base plants of similar capacity in which production costs are 25 cents per lb higher. He said that the alcohol base plants are uneconomic except in times of great emergency, and that they could be kept in standby condition to be used only when needed. Mr. Litchfield also revealed that synthetic rubber production from existing reactors can be increased 50 per cent through a new method which reduces the cycle time of the blending operation by as much as one half. He said that expanding American synthetic rubber production capacity will not only prevent wild increases in the price of natural rubber as occurred last year when it soared to 85 cents a lb from 24 cents, but also will help forestall or decrease the deficit in world rubber supply which is expected to develop by 1960.

1951 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

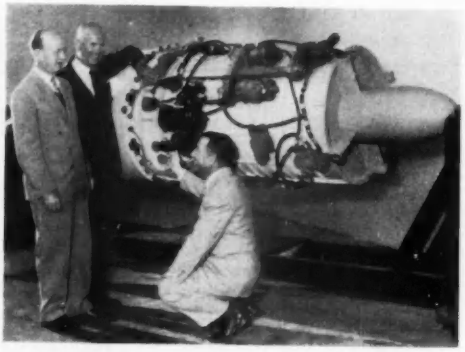
	Passenger Cars	Trucks	Buses	Totals 1951	Totals 1950
First Quarter	1,601,853	376,312	2,011	1,980,176	1,637,486
Second Quarter	1,497,005	410,280	2,399	1,909,684	2,112,816
Total—Six Months	3,098,858	785,592	4,410	3,889,860	3,750,307
July	381,407	110,244	885	492,316	706,702
August	426,932	121,993	783	549,708	818,123
Total—Eight Months	3,907,197	1,018,829	5,958	4,931,884	5,275,132

1951 MOTOR TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-26,000	Over 26,000	Total
First Quarter	164,304	70,998	26,073	67,889	18,099	18,706	16,443	376,312
Second Quarter	174,654	73,966	33,930	77,002	18,915	21,493	10,320	410,280
Total—Six Months	338,958	144,964	60,003	144,891	37,014	40,199	26,763	786,592
July	45,774	21,238	7,432	22,312	4,798	5,717	2,573	110,244
August	50,304	22,699	7,412	24,071	6,638	7,215	3,664	121,993
Total—8 Mos. 1951	435,036	188,891	74,847	191,074	48,450	53,131	27,400	1,018,829
Total—8 Mos. 1950	420,350	182,112	65,104	147,733	38,186	29,854	19,068	900,407

*—Automobile Manufacturers Association.

WOOD JET



Ivan L. Wiles, Buick's general manager and GM vice - president (center); Edward T. Ragsdale, general manufacturing manager (left); and Verner P. Mathews, chief engineer (right), are seen inspecting the wood model of the Wright J-65 Sapphire jet engine that was built at Buick with 4000 man hours and 12 weeks time. So new is the British designed jet that no production model was available for study by the engineering, tool designing, and manufacturing departments. This wood model enabled the three departments to get an absolutely true, three-dimensional model of the jet.

Unit of Chrysler Engine Plant Nearly Finished

Chrysler is building its new plant at Trenton, Mich., near Detroit, in two units of nearly equal dimensions. The first unit is expected to be completed by the end of October with the second one scheduled to be finished next year. Harry A. Matheny, vice president and general manager, addressing a Chamber of Commerce meeting in the Trenton area, said that the new plant is being built to provide additional facilities for production of passenger cars and engines and will augment engine building activities at the present Dodge, Plymouth, DeSoto, and Chrysler plants. He said that the Trenton site was selected because it was close enough to the company's major assembly plants to provide low transportation costs, is accessible to materials required, and has the necessary utilities and space available. He estimated that when the new plant is in operation it will add as much as $15 million annually to retail business in the surrounding area.

Fruehauf Signs $25 Million Loan Agreement

Fruehauf Trailer Co. has signed a V-Loan agreement for $25 million with 21 banks. The National Bank of Detroit is acting as agent for the agreement.

OPS Issues Rules for New Machinery Makers

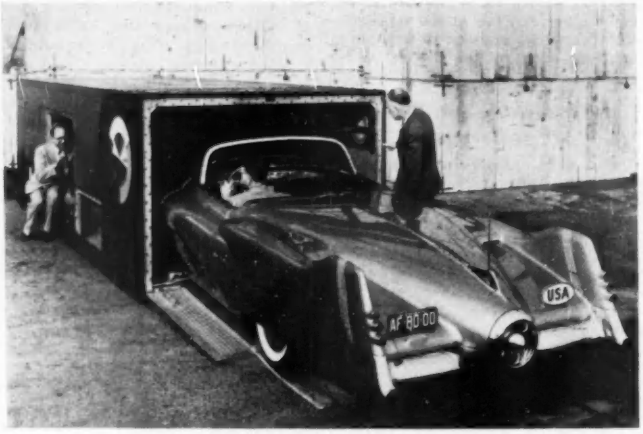
Those machinery manufacturers who were not in business before Jan. 1, 1951, may apply to Office of Price Stabilization in Washington for approval of proposed ceiling prices. They may apply for either specific ceilings or a price-determining method of control. OPS announced the procedure to guide new manufacturers who are unable to determine ceilings under the machinery ceiling price regulation (CPR 30). Producers can make application for prices on OPS Public Form 90 or 91. Before getting word of approval, they may quote or charge proposed ceilings, but may not accept payment for more than 75 per cent of the price. If OPS does not take action within 30 days after receipt of the application, proposed ceilings will be considered approved. There's a catch, however—the agency later may disapprove the prices. Any seller who has set his prices under the General Ceiling Price Regulation may continue to use such ceilings until OPS acts on his application.

American Welding Plans $5 Million Expansion

American Welding and Manufacturing Co. has underway a $5 million expansion program at its Warren, O., plant. The money will be spent for additions to the plant and for equipment to increase production of parts for jet and reciprocating aircraft engines.

AMA Finds Small Gain in Top Car Speeds

Contrary to general opinion, there has been no substantial increase in the top speed of automobiles since 1935, according to the Automobile Manufacturers Association. During the last ten years, average increase in speed amounted to only about three per cent, according to AMA's findings. The study says further that while horsepower has gone up an average of 21 per cent, the increased power is being utilized for better all around performance and economy. Accelerating ability is up 16 per cent since 1935, whereas, fuel consumption has dropped an average of 14.6 per cent.



HEADED OVERSEAS

The Le Sabre, GM's new experimental automobile, ready for exhibition abroad, is driven into a special aluminum-covered container at Fairlawn, N. J., for shipment to Europe. Built to test new mechanical and styling ideas, the car was shown at the International Automobile Exhibition in Paris.

INDUSTRIES

Reo to Pay Off RFC With Bank V-Loan

Reo Motors, Inc. will pay off its indebtedness to RFC with part of a $9 million V-loan negotiated with three financial institutions. At the end of June, Reo's outstanding obligation to RFC stood at $4,765,847. Under the terms of the loan, Reo could not pay dividends without RFC approval. The V-loan has been arranged with National City Bank and the Guaranty Trust Co., both of New York, and Michigan National Bank at Lansing. All three banks will participate equally.

Al-Fin Grants License to Zollner Machine

A license for the manufacture of molecular bonded bi-metallic pistons has been granted by the Al-Fin Div., Fairchild Engine and Airplane Corp., to the Zollner Machine Works, of Fort Wayne, Ind. Under the terms of the license agreement, the Aluminum Co. of America and the Bohn Aluminum and Brass Corp. will use the patented Al-Fin process in bonding and casting operations in production of piston castings for Zollner.

Buick to Build New Parts Warehouse

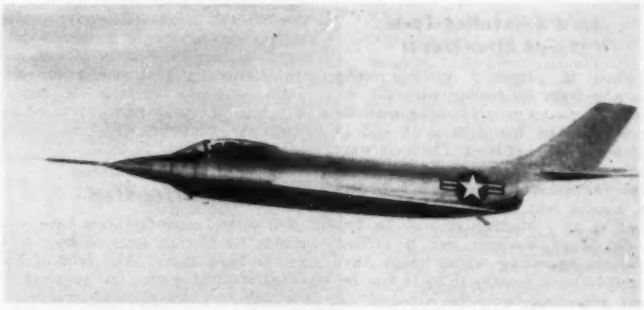
Buick has received government approval to build a new 60,000 sq ft parts warehouse in Chicago. It will replace the present Chicago warehouse and will serve Buick dealers in three midwestern zones.

Fram Opens New Ohio Plant

Fram Corp. officially opened its million-dollar new filter plant at Greenville, O., recently. The new Fram plant is 600 ft long and 200 ft wide, with a two-story center section of 30,000 sq ft. The entire plant provides 150,000 sq ft of working space.

Cleveland Pneumatic Buys Engine Stand Business

Cleveland Pneumatic Tool Co. has acquired patent and manufacturing rights, machinery, and tools for manufacture of engine-stand equipment from Clayborne Manufacturing Co. Also included in the deal is the complete inventory of finished products and materials in process. Equipment and materials are being transferred from Clayborne's Chicago plant to a factory which has been remodeled adjacent to Cleveland Pneumatic's main plant at Cleveland.



Acme

FLYING DEMON

This is the first flight photograph of the McDonnell F3H-1 Demon Navy jet fighter showing the plane on a test flight near the McDonnell plant in St. Louis. This experimental plane is the prototype for the production models to be built by both McDonnell and the Goodyear Aircraft Corp.

Rubber Research Envisions Synthetic Truck Tire

Research scientists are getting closer to their goal of a synthetic rubber for truck tires that will be even better than natural rubber, according to L. R. Jackson, president of Firestone Tire and Rubber Co. He did not say that such a rubber is actually in sight, but was optimistic that eventually it will be found and possibly not too far in the future.

Allis-Chalmers Concludes $40 Million Bank Credit

Allis-Chalmers Manufacturing Co. has concluded a $40 million bank credit agreement. The funds to be used to finance its increased defense production contracts. Twenty-five banks located throughout the United States are participants in the loan, and the group is headed by the First National Bank of Chicago.

Automotive Tax Increases to be Passed to Buyers

There has been some speculation about automobile truck and parts makers not being able to pass on to the customer the proposed three per cent increase in excise taxes on vehicles and parts if and when it becomes effective under the new tax bill. However, Detroit manufacturers say that OPS pricing regulations specifically permit passing on such tax increases if excises have been passed on previously, which, of course, they have. It is estimated that the new excise tax would boost the price of cars from $35 to $100 and of trucks in the ½- to 3-ton range by $50 to $175. One company figures that tax increases will cost the nation's motorists and trucking industry at least $450 million next year.

FRB Study Shows Family Units Buy More Cars

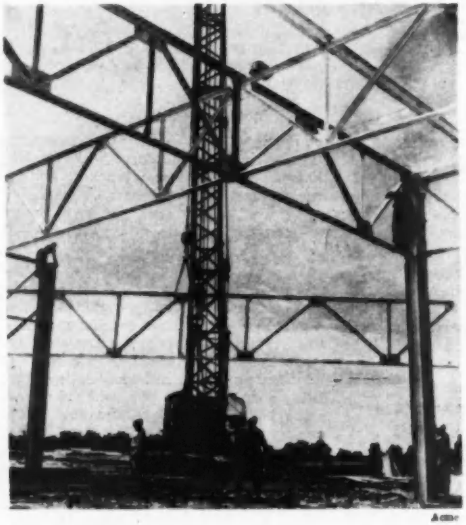
Latest statistics compiled by the Federal Reserve Board reveal that the percentage of families owning automobiles early this year has risen sharply since early 1949. About 65 per cent of all families owned automobiles in early 1951, a rise of nine per cent from the same period two years ago and eight per cent higher than in late 1941. The FRB survey also revealed that families with incomes of $5000 or more bought 54 per cent of the new cars sold in 1950. Families with incomes under $3000 showed a marked decline in new car purchases, accounting for only 14 per cent of new car sales last year as compared to 24 per cent in 1949. On the other hand, sales of new cars to clerical, skilled and semi-skilled workmen, and sales personnel, jumped to 50 per cent last year from 33 per cent in 1949. New car purchases by businessmen, farmers, professional men, and young families, declined between 1949 and 1950.

Besly Co. Building New Plant

Charles H. Besly and Co. is building a modern one-story plant in South Beloit Wis., which will house both divisions of the company. Useful floor area will be increased by approximately 20 per cent over the present plant, and productive capacity will be increased approximately 100 per cent over present output.

Ford Renovating Tools Stored After War II

Ford is currently cutting many months from its tooling time for defense work by rehabilitating machine tools used in World War II and in storage since that time. The tools were stored by the military at the end of the last war and many of them are encased in plastic coatings under which is a coating of protective grease. In two weeks Ford workers had a milling machine operating which would have required eight months to build new before materials could be obtained. A boring machine will require only three to four months to fit with special drilling jibs, compared with eight to ten months to build a new machine. It is estimated that the program is saving the taxpayers 75 per cent or more of the cost of new equipment. The rehabilitated machines will be located in Ford plants in the Detroit area and elsewhere in Michigan for the company's various defense projects.



COMPLETING LINES

Expected to be completed in 1952, this plant, now under construction near Wayne, Mich., will house all Lincoln assembly operations now performed at the Detroit Lincoln plant, and the Mercury assembly line located at the Rouge plant in Dearborn. Steel construction is well underway, and water, gas and sewer lines are just about completed.

Goodyear Joins Battle for Road Expansion

Goodyear Tire and Rubber Co. is stepping into the fight for more and better highways with a series of factual and hard hitting newspaper advertisements. Headline on the first advertisement says bluntly "we must face the highway crisis now—there is only one *real* cure!" Copy points out significantly that the nation would stagnate without motor transportation and that the real problem is too few modern roads, and not the number of cars and size of trucks. The advertisement also carries statistics showing the important role of motor transport in the general economy.

Car Makers Using Imported Steel

Automobile manufacturers have been turning to foreign steel to keep production lines going. The cost of imported steel is high, but no more in many cases than that of conversion steel. Studebaker has been active in obtaining steel from Belgium and has already received several shipments of both carbon and alloy steel of forging quality.

Defense Dept. Booklet on Security Clearance

Prospective bidders on defense contracts can learn from a new Defense Dept. booklet how to obtain clearance needed before obtaining information on products regarded as confidential or secret. Entitled *How to be Cleared for Handling Classified Military Information within Industry*, the publication was prepared by the Munitions Board's Office of Industrial Security. The booklet gives, in question-and-answer form, statements on what constitutes classified information, what is covered by clearances, and related facts.

Allocate More Aluminum to Rivet Makers

An additional 1 million lb of aluminum has been allocated to rivet manufacturers for fourth quarter production. This supplementary supply is to go only to aircraft manufacturers for first quarter 1952 production the Defense Production Authority said in making the action. The DPA estimates that the aircraft industry will need about 2.8 million lb of rivets during the first quarter. It had already allocated some 1.5 million lb for this purpose, leaving a deficit of about 300,000 lb which will have to come out of early first quarter allocations.

Instrument Group Names New Officers

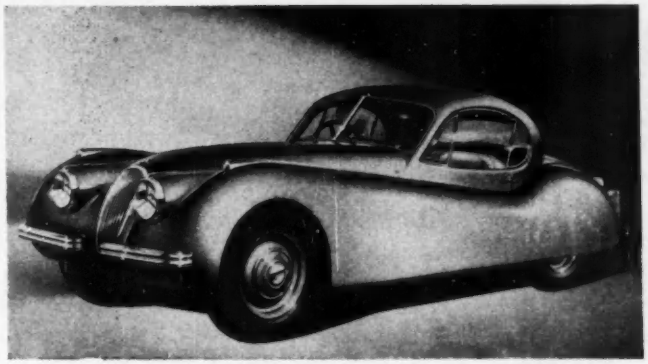
The Instrument Society of America at its Sixth Annual Instrument Conference and Exhibit held in Houston, Sept. 10-14, elected the following national officers: Dr. Arnold O. Beckman, president; David M. Boyd, Jr., vice-president; Robert T. Sheen, vice-president. Still incumbent are: W. A. Wildhack, 1st vice-president; N. L. Isenhour, vice-president; G. R. Feeley, treasurer; and Richard Rimbach, secretary.

Munitions Board Information Center at Pentagon

Once again, the Munitions Board's Central Military Procurement Information Office will operate at the Pentagon. Its staff of specialists, after using for approximately five months Washington's Old Post Office building, has set up shop in the Pentagon's Room 3D758. In its two-year history, the agency has assisted thousands of businessmen in obtaining information on what items the military services buy, and where transactions are made. In April of this year the office was moved from the Pentagon into Washington in the expectation that the location would be more convenient to incoming business personnel.

Atomic By-Product Used in Tire Manufacture

Sieberling Rubber Co. is using atomic energy in its tire manufacturing operations. The equipment is a Beta-ray gage which automatically figures weight of fabric sheeting moving continuously from the calendering machine. Principle of the gage is the sending of radio-active waves from a small capsule



HARD TOP JAGUAR

This new Jaguar XK 120 hard top coupe was recently shown for the first time at the British Automobile Show in Boston. Powered by a 160-hp engine, this car is a version of the Jaguar XK 120 Super Sports model which is described as the fastest production car in the world having been clocked at 132.6 mph in official record trials in Belgium.

of Strontium 90, a by-product from the Atomic Research Laboratory at Oak Ridge, upward through the sheeting to a detector mounted several inches above the fabric which in turn automatically translates the amount of radiation reaching it into weight a square yard. The figures are recorded continuously on a graph so that the operator can determine the thickness of the fabric as it passes through the calendar. The gage is so sensitive that variations of ten thousandths of an inch are recorded.

Cornell Improving Big Wind Tunnel

The Cornell Aeronautical Laboratory Inc. will improve its huge wind tunnel in Buffalo, N. Y., at a cost of $1.5 million so that models of aircraft and missiles can be tested in the transonic speed range, or approximately at the speed of sound. The tunnel's horsepower will be increased from 14,000 to approximately 33,000.

Name Stewart NPA Official

Leroy C. Stewart, manager of the Atlanta sales office of the Dow Chemical Co., has been named chief of the Facilities Branch, Chemical Division, National Production Authority. He is a member of the American Institute of Engineers and the American Chemical Society.

AC Spark Awards Expansion Contract

A contract for major plant expansion building project which will increase manufacturing floor space at the Dort Highway plant of GM's AC Spark Plug Div. by approximately 50 per cent has been awarded to Cunningham and Limp, general contractors of Detroit. The new construction will provide approximately 590,000 sq ft of added manufacturing floor space.

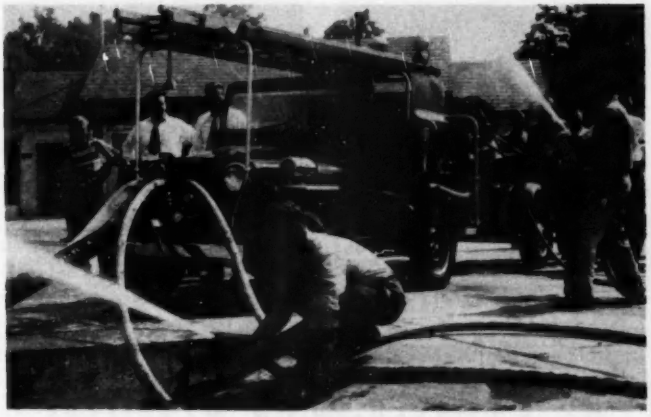
AC Spark has more than $236 million worth of defense contracts for the Air Force, most of which is concentrated at the Milwaukee plant. The figures were revealed by C. E. Wilson, GM president, in an address at Milwaukee. He added that currently GM's volume of defense work is under 10 per cent of its total output and that 30,000 employees had been laid off within the last six months.

Tool Builders Eligible for Government Loans

Machine tool manufacturers regardless of whether or not they have government contracts have been made eligible for government guaranteed loans under the V-loan plan. Financing will be available for working capital and expansion. It covers not only the manufacturers of complete tools, but also their subcontractors and suppliers. A previous government provision permitting machine tool builders to get advance payments of up to 30 per cent of their contracts for tools for the government remains in effect but has been found to be inadequate to finance expansion of production.

Commerce Bulletins List Subcontracting Exhibits

Dates and locations of proposed subcontractor exhibits sponsored by the armed forces are going to be publicized in a pair of Commerce Dept. bulletins. The Munitions Board has authorized presentation of this information in Commerce's *Synopsis of Proposed Procurements* and *Synopsis of Contract Award Information.*



JEEP FIRE FIGHTER

The Jeep turns up in a new uniform as Willys-Overland demonstrated its new fire-engine version to military and civil defense officials. Here firemen man two of the four outlet hoses on the Jeep firefighter as it pumps 500 gal of water a minute from the Potomac River. Designed primarily for military and civil defense use, it is equipped with hoses, water pump, ladders, extinguishers, emergency lights, and a 200-gal tank for either water or chemicals.

The one appeal that doesn't change when models do

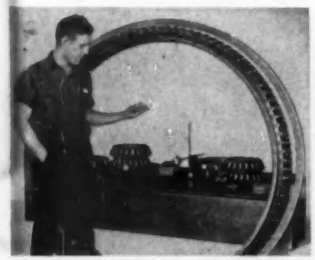
MAYBE one year it's a car's transmission that makes the headlines. The next, it's a new-design engine. Another time, styling steals the show. But what makes up *most* prospects' minds *every* year is the value they get for their dollars. Especially the value that's built into the moving parts—the "vital zone".

So when you buy "vital zone" parts for your car, be sure they'll give top value. This simple guide to value may help you do it:

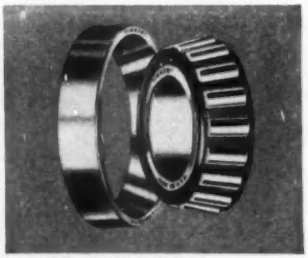
$$Value = \frac{quality + service + public\ acceptance}{price}$$

Obviously, a big advantage above the line will give you more value than a small one below the line. Since no other bearing can match the uniform high quality, extensive service, and overwhelming public acceptance you get with Timken® bearings, Timken bearings are your best value! The Timken Roller Bearing Company, Canton 6, Ohio.

How TIMKEN® bearings give you value where it counts most . . . in the "vital zone":



5,850 SIZES. You may not need a 71½" OD Timken bearing, or one smaller than your finger. But the world's greatest range of tapered roller bearing sizes is evidence of the engineering leadership that means more value in the Timken bearings you buy.



PREFERRED FOR PINIONS. Timken bearings are used on the pinion—toughest bearing application in a car—by all but two car makers. And they're also giving top value at other "vital zone" points . . . in wheels, transmissions, differentials, steering gears.

ONLY TIMKEN BEARINGS GIVE YOU ALL THESE VALUE FEATURES

QUALITY

1. Design leadership
2. Steel made in our own mill
3. Precision manufacture
4. Rigid quality control
5. More than 50 years' experience

SERVICE

6. Unequalled engineering service
7. Unequalled research and development facilities for your use
8. Installation service in the field
9. Widest range of sizes
10. Most dependable source of supply

PUBLIC ACCEPTANCE

11. First choice throughout industry
12. Best-known name in bearings
13. Widespread advertising

it's TIMKEN for VALUE

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL ↓ AND THRUST →◯← LOADS OR ANY COMBINATION ↑

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Motor Products Corp.—**Leo G. Jacques**, executive vice-president, has been elected president. He succeeds **A. L. Lott**, who has been elected chairman.

Columbia Steel & Shafting Co.—**E. L. Parker**, resigning as president, was elected chairman of the board. **George E. Parker** was elected president. **George P. Kraemer** was re-elected executive vice-president and comptroller; **C. E. S. Dickerson**, vice-president in charge of sales; **T. D. Reno**, treasurer; **G. A. Devey**, secretary, and **H. M. Brightman**, assistant to president and chief engineer.

The White Motor Co. — **Milton W. Brooks** has been named sales manager of a new industrial sales division to develop new markets for component units of White trucks and buses.

Texas Engineering and Manufacturing Co., Inc.—Election of **John A. Maxwell, Jr.** and **Clyde Williams** as vice-presidents was announced.

Bendix Aviation Corp.—**Alan Kahn** was appointed industrial relations director of the new Utica Div.

Fairchild Engine and Airplane Corp., Fairchild Aircraft Div. — **Warren A. Shuping** takes over the position of manager of the Quality Control Dept. vacated by **Phil I. Harr** who has been made director of quality control of both the Hagerstown and Chicago facilities.

Kaiser-Frazer Corp. — The appointments of **R. L. Logue** as chief body engineer and **D. H. Tillotson** as chief engine and chassis engineer has been announced.

Black & Decker Mfg. Co.—**John F. Spaulding** has been named sales manager.

Packard Motor Car Co. — **Ross H. Schroeder** has been promoted to manager of the business management dept.

Allegheny Ludlum Steel Corp.—**John E. Groves** has been appointed director of industrial relations and **Ralph L. Ostrander** manager of labor relations.

Sealed Power Corp.—The retirement of **J. Howard Ballard** as chief engineer and the promotion of **Edwin C. Beck** to this position has been announced.

Westinghouse Air Brake Co.—**W. C. Landis**, vice-president, was appointed general manager of the Air Brake Div., and **A. M. Wiggins**, vice-president, was appointed general manager of the Union Switch and Signal Div.

Thompson Products, Inc.—Brig. Gen. Horace A. Shepard, who resigned recently from the U. S. Air Force, has been appointed vice president.

Mack Trucks, Inc. — G. F. Jones has been elected vice president of Mack Manufacturing Corp., Mack Motor Truck Corp., and Mack Motor Truck Co.

Oliver Iron & Steel Corp.—**Martin L. Killgallon** has been named plant manager of the Berry Div. in Corinth, Miss.; **William N. Boyd** has been designated superintendent of Div. I and **Walter Most** as acting superintendent of Div. II.

United States Rubber Co.—**Samuel R. Phillips** has been appointed assistant general manager of the textile division. He succeeds **William E. Clark** who will become a vice-president and general manager of the textile division.

United States Rubber Co., Tire Div.—Creation of six divisional sales areas and the promotion of six executives to the position of divisional manager has been announced: **Wm. J. Palmer** becomes manager of the Eastern Div.; **Frank C. Johnson** will head the new North Central Div.; **Ben H. Bowen** will be division manager of the Central Div.; **James E. Kennedy** will serve as divisional manager of the new Mid-Western Div.; **Harry C. Oliver** becomes divisional manager of the Western Div.; and **Harry R. Mack** has been assigned as divisional manager of the Southern Div.

The Lincoln Electric Co. — **L. K. Stringham** has been appointed chief engineer.

Norton Co.—**John C. Ewer** has been appointed managing director of Norton Grinding Wheel Co., Ltd., England.

The DoALL Co.—**J. W. Gooch** has been appointed assistant plant manager in charge of manufacturing operations in the production of band tools.

General Motors Corp. — **William M. Walker, Jr.** has been appointed to the Central Office staff of the Schedules and Procurement Section as administrator of government regulations pertaining to controlled materials.

Nash-Kelvinator Corp.—**W. F. Poupard** has been appointed assistant production manager-aircraft engines.

Lockheed Aircraft Corp.—**Richard L. Bean** has been appointed publicity manager.

E. I. du Pont de Nemours Co., Inc.—**W. Laird Stabler** was appointed head of the new Organization Planning Div. within the Employee Relations Dept.

Libbey-Owens-Ford Glass Co. — **Don W. Lyon** has been named manager of textile sales in the new Fiber Glass Div.

United Aircraft Corp., Pratt & Whitney Aircraft Div.—**Charles T. McKinnie** has been appointed assistant sales manager.

Westinghouse Electric Corp.—Four production executives of the jet engine plant have been named: **C. L. Van Derau** becomes general works manager in charge of both the Mansfield and Columbus plants; **E. L. Smith**, works manager at Columbus; **C. D. Heaton**, manager of manufacturing at Columbus; and **John B. Roman**, works engineer at Columbus.

Necrology

C. L. Best, 73, pioneer inventor and tractor builder, and one of the founders, chairman of the board, and member of the executive committee of the Capterpillar Tractor Co., died Sept. 22, in San Francisco, Calif.

Joseph Goldberg, 81, former experimental engineer for the Motor Products Corp. of Detroit, died in Los Angeles, Calif., Sept. 18.

Fred C. Hillman, 55, plant manager of the Detroit Chevrolet forge plant, died Sept. 22 in Flint, Mich.

The RIGHT Abrasive gets the job done BETTER

You can be sure of using the right abrasive in every case by selection from the *complete* CARBORUNDUM line... the only complete line of abrasives manufactured under one brand name. For utmost economy in metalworking, you'll find it pays to standardize on abrasives from the *complete* CARBORUNDUM line

● Improved V10 Bond Centerless Grinding Wheels by CARBORUNDUM are engineered to maintain grinding efficiency with minimum contact pressure. Their cool free cutting action makes them ideal for heavy stock removal on both hard and soft materials.

● Excellent form holding qualities, less wheel dressing and fewer machine adjustments during a run are outstanding features of Internal Grinding Wheels by CARBORUNDUM. Effectively applied to wide range of work; low inventory requirements.

● Bonded products by CARBORUNDUM for general purpose and weld grinding expedite a high rate of production at lowest cost. Typical example is the Type 1 Portable Grinding Wheel with *built-in* rubber bushing, which reduces wheel "bounce"... lessens operator fatigue.

See Your **CARBORUNDUM** distributor... or write Dept. AI 81-25.

Only CARBORUNDUM

TRADE MARK

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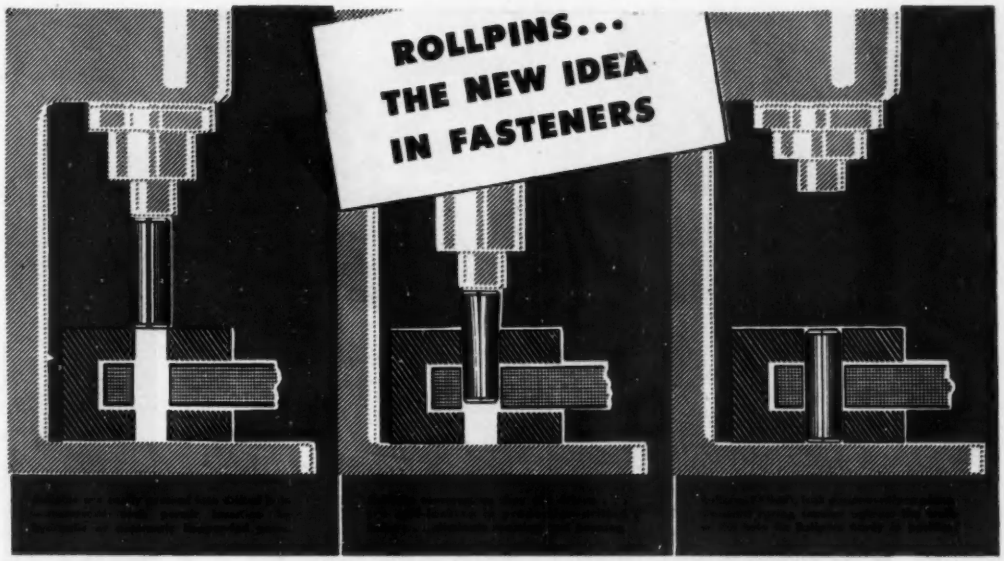
makes ALL Abrasive Products ...to give you the proper ONE



How to eliminate rivets and set screws with Rollpin self-locking fasteners

Now put real fastener economy into your assembly procedure. With Rollpin metal fasteners as replacements you can eliminate many rivet and set screw applications and avoid the peening or threading operations which they require. One stroke of a press sets a Rollpin firmly in place, flush with the face of your assembly. This means real savings to you in costs and time.

It will pay you to investigate Rollpins for your product as a cost saving replacement for steel fastening pins, pivot or hinge pins, clevis pins, cotter keys, locating dowels, or shafts.

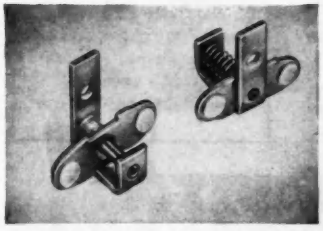
Rollpins exceed the shear strength of cold-rolled pins—are easily adapted to jig assembly or automatic hopper-fed presses. They provide a firm vibration-proof fit until deliberately removed with a pin punch . . . and since Rollpins do not enlarge the hole, *the same pin* can be re-inserted with a hammer!

For details on Rollpins, write to Elastic Stop Nut Corporation of America, 2330 Vauxhall Road, Union, New Jersey.

ROLLPIN™ A PRODUCT OF

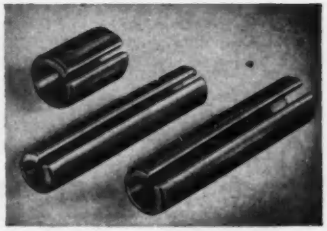
ESNA

ELASTIC STOP NUT CORPORATION OF AMERICA

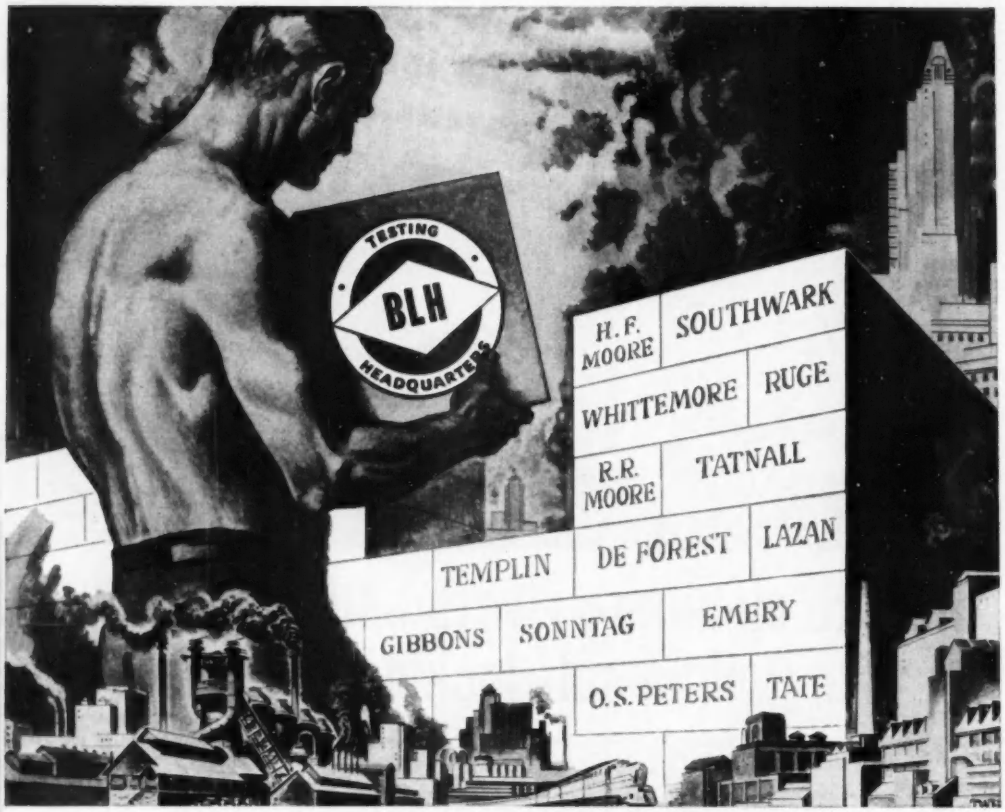


Rollpin acts as guide shaft for spring-loaded relay contacts. Inexpensively and simply pressed in place . . . riveting operation eliminated . . . it outwears previous brass rivet by ten times.

Rollpins replace set screws for pinning pulleys to shafts. Hole tapping operation is avoided and Rollpin holds tight against vibration until deliberately removed.



Rollpins are supplied to specified lengths with chamfered ends. They are available from stock in a wide range of lengths in diameters from 5/64" to ½" in Carbon and Stainless Steels.



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is built on a Foundation of FAMOUS NAMES

You know these names—for every one represents a major contribution to the science and art of materials testing. And every one has helped to make B-L-H Testing Headquarters the source of the newest in all varieties of fine testing equipment.

Over the years, Testing Headquarters has been a Clearing House for pioneering ideas, where every new development was sure of a welcome and a hearing. The results appear in such typical items as the line of fatigue testers, the versatile strain gage devices, the trail-blazing high-temperature testing equipment. Many of the most spectacular developments of the past decade rest squarely on the new, significant data provided by these new fact-finding machines.

Perhaps improvements in your present lines, or the development of new products are waiting on more accurate knowledge of the service properties of materials or components. If so, you will find it profitable to discuss the problem with one of our representatives.

If we don't have equipment ready to do the job for you, the composite experience behind these famous names is available to develop a right answer.

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Eddystone Division • Baldwin-Lima-Hamilton Corporation • Philadelphia 42, Pa.

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Continuous **broaching of multiple parts**

• Wherever metal is removed on duplicate small parts you are apt to find a place where Footburt Surface Broaching Machines can cut manufacturing costs. Production is high, and tool maintenance is low in cost per piece. We have had many years of experience in designing the tooling for various types of parts and will gladly advise you in applying surface broaching to your work.

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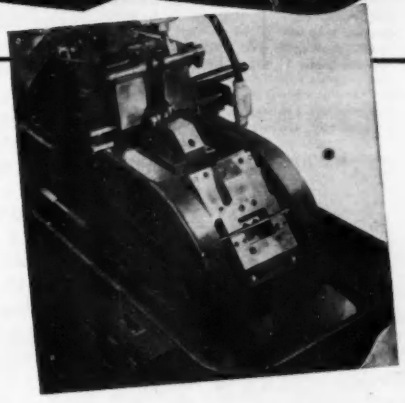
Detroit Office: General Motors Building



Holding fixtures are designed for quick, convenient loading, with automatic clamping and unclamping.

FOOTBURT machine tools

. . . a time tested line of machine tools

Shown here are representative sizes from the complete line of I-R Air Impactools designed to meet all nut-running requirements.

A mid-western manufacturer of materials handling equipment saved $10,000 in one year by installing Ingersoll-Rand Air Impactools on an idler assembly nut running job in his plant. The installation of the Impactools and accessory equipment cost $1200, which quickly paid for itself in 33 days!

Similar time and labor savings can be made in your plant, on your jobs. Air Impactools are available in thirteen sizes to handle nut running jobs up to 4" bolt size. The smallest Impactool, for work up to 7/32" bolt size, weighs only 1¾ pounds; the twelve larger sizes are correspondingly packed with top power per pound.

You get no tiring and wasteful kick or twist with an Impactool . . . full power is delivered to the work . . . quickly running up or removing nuts and screws. Ingersoll-Rand, *originator of Impactools*, has manufactured these sturdy and reliable machines for 18 years. Today they are in use in thousands of plants around the world, saving countless dollars and hours. Call, write, or wire your Ingersoll-Rand branch office—an Air Power Specialist will be glad to give you complete details, or arrange an eye-opening, dollar-saving trial or demonstration in *your* plant.

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Vast Automotive Plant Expansion for Defense Work

With so much attention currently directed toward the struggle to get enough materials to maintain civilian production, it is easy to lose sight of what actually is happening to the U. S. economy. Instead of a conversion problem involving a shift of practically all civilian facilities to war work, as was done in World War II, the current plan is to superimpose a military production program on top of a civilian economy to the extent that the latter would continue to operate at a relatively high level. The result is certain to put a strain on supplies of raw materials both for construction of new defense plants and equipment and for output of civilian goods and a certain amount of civilian expansion by industry.

The automotive companies in the past year, and particularly since the start of the Korean war, have been undergoing expansion of facilities for both civilian and defense use. It is difficult in many cases to differentiate between the two, because in some instances plants were planned or actually started for civilian production and have since been committed to defense work. Also, there have been some projects announced and then shelved because of the shortage of materials, such as the 11-story administrative office building planned by Ford.

Even if there had been no military crisis, expansion in the automotive industries this year would have been very sizable. Ford, for example, early this year said that it would spend $1 billion over the next three years on expansion of facilities and plant improvements. Since World War II, Ford has spent $600 million on modernization. General Motors and Chrysler also have had continuing expansion programs in effect as have Nash, Studebaker, Kaiser-Frazer, and Packard on a more modest scale.

Fast Tax Writeoffs Reasonable

An important fact to remember in connection with the shortened amortization period granted by the Government for tax purposes on plants to be used in defense work is that these plants are being built with private funds and with no assurance to the individual companies involved as to when they may be converted for civilian production. Present military planning calls for tooling up a defense production system and having it ready to produce in case of emergency, but with perhaps very little actual production to be carried out. As a result, automotive companies may find they are building and equipping plants with their own funds for defense purposes, which they may not be able to convert to civilian use for 10 years or more if the emergency should last that long. The fact that they are going ahead on such an uncertain footing should effectively silence all criticism about fast tax writeoffs.

Because of the complex nature of the automotive industries, which includes many divisions of the large companies and thousands of suppliers, it is extremely difficult to get a complete listing of all expansion currently underway. However, there is enough information available about major expansion programs to give a good indication of the scope of the undertaking. Certainly it is sizable enough to mean a tremendous volume of business for suppliers of machine tools, heat treating equipment, conveyors and other materials handling equipment, and the hundreds of other items that are required before production is possible.

Subcontracting on Large Scale

THE big part that subcontractors and suppliers play in the automotive industries is indicated by the fact that ordinarily in peacetime suppliers in the United States, generally small businesses, get over 50 per cent of the income received by automotive companies. Out of every dollar received for war orders by automotive companies in 1942, approximately 56 cents went to subcontractors and suppliers, of which 63 per cent were small businesses employing less than 500 persons. The historical pattern of subcontracting inherent in the automotive industries is being followed in the production of current war orders and thousands of subcontractors have already been selected.

AUTOMOTIVE INDUSTRIES
August 15, 1951

By Leonard Westrate

Ford Program

Ford's program, which was sizable before the current war started, has been greatly expanded for defense work. A new Lincoln-Mercury assembly plant of 1.3 million sq ft will be built at Wayne, Mich., for possible defense work initially. A new plant is going up near Kansas City, and will have more than 1.3 million sq ft of space. It originally was scheduled for a Ford assembly unit, but will be used for building aircraft wings. Also, an addition is being put up at Dallas to increase the Ford assembly plant space there by 287,000 sq ft. The company also is erecting a large tank plant just west of Detroit, which will have 1.5 million sq ft of space. The transmission plant at Cincinnati is being expanded by 220,000 sq ft, nearly tripling its size, and a new parts plant is being built at Ypsilanti, Mich., with 400,000 sq ft. Ford also is planning or has completed recently, parts depots at Memphis, Cleveland, Dallas, Cincinnati, Los Angeles, Pittsburgh, Somerville, Norfolk, and Atlanta. Ford also has put into operation its 750,000 sq ft plant at Monroe, Michigan, acquired more than a year ago from Kelsey-Hayes. The plant is used for production of parts. Two of the largest Ford expansion projects are a 1.3 million sq ft stamping plant at Buffalo, practically completed, and a new engine plant and foundry at Cleveland. The engine plant will contain 1 million sq ft and the foundry 1.2 million sq ft. Ford also may build a new plant to produce jet engines, but the location or size has not yet been announced.

General Motors Plant Projects

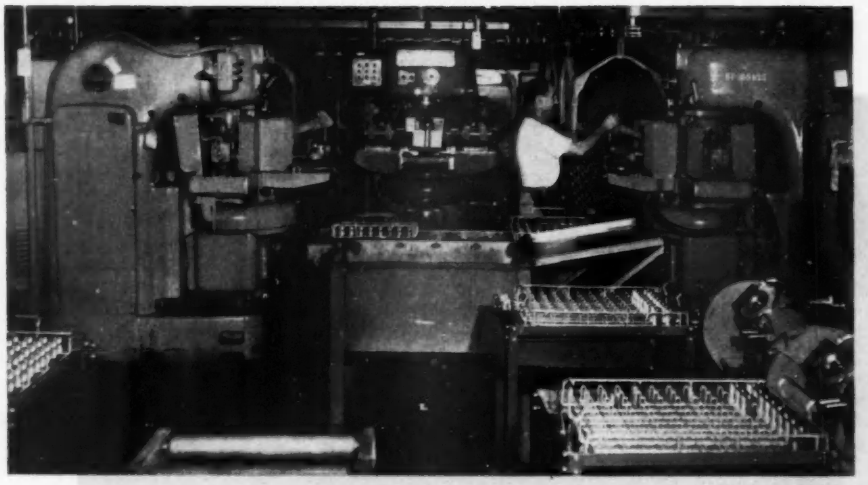
General Motors also has a large number of new plants or additions underway all to be paid for out of its own funds. Buick Division has the largest program. It includes a new manufacturing plant, 666,000 sq ft; a jet engine parts plant, 580,000 sq ft; a jet parts machining plant, 1.6 million sq ft; and a 170,000 sq ft addition to its foundry, all at Flint, and a jet engine assembly plant at Chicago with more than 1 million sq ft of space. Buick has 1.2 million sq ft devoted to war work now, and by late next summer will have 4 million sq ft. At the peak of World War II activity, Buick's total was 3.5 million sq ft.

Chevrolet is spending $21 million for three new buildings at its Tonawanda, N. Y., operation for aircraft engine work. These include a new engine plant

(*Turn to page 96, please*)

Partial List of Plant Expansion Projects in Automotive Supplier Industry

	Size or Dollar Value
Midland Steel Products Co., Detroit, purchased from Hupp Corp. plant	280,000 sq. ft.
Thompson Products, Inc., plant addition—Cleveland	300,000 sq. ft
Eaton Mfg. Co., Pump Div., Expansion, Marshall, Mich.	$1 million
Forge & Heat Treating Plant, Battle Creek, Mich.	$675,000
Monarch Machine Tool— Modernization & New Construction, Sidney, O.	42,000 sq. ft.
Gemmer Mfg. Co., Addition to plant, Detroit	70,000 sq. ft.
Gerity-Mich. Corp., New plating plant, Adrian, Mich.	20,280 sq. ft.
Westinghouse Electric Corp. New headlamp plant, Madison, Wis.	175,000 sq. ft.
New aircraft instrument plant, Baltimore	400,000 sq. ft.
Allis-Chalmers, Non-ferrous foundry, Norwood, O.	16,800 sq. ft.
Tinnerman Products, Inc., New Plant, Cleveland	150,000 sq. ft.
A. O. Smith Corp., Leased from Packard, Toledo	300,000 sq. ft.
Cummins Engine Co., Inc., New Plant	92,000 sq. ft.
National Batteries, Inc., New industrial battery plant, Monroe, Mich.	$1 million
Norton Co. New grinding machine plant, Worcester, Mass.	222,000 sq. ft.
Purolator Products, Inc. New plant, Ringtown, Pa.	40,000 sq. ft.
Ex-Cell-O Corp., aircraft engine parts plant, Lima, O.	175,000 sq. ft.
Continental Motors, plant addition, Detroit	25% increase
Carboloy Co., Inc., plant expansion, Detroit	13,000 sq. ft.
New plant, Edmore, Mich.	45,000 sq. ft.
Cleveland Graphite Bronze Co., buy or build 5 new plants	$25 million
Mack Trucks, service parts bldg., Bridgewater, N. J.	425,000 sq. ft.
Westinghouse, jet engine parts plant, Columbus, O.	1.9 million sq. ft.
Borg-Warner Corp., Wooster Div., aircraft fuel pump plant, Wooster, O.	104,000 sq. ft.



Here is a perspective of a battery of three National Broach Red Ring gear shavers set-up for shaving long and short pinions. The operator at the right may be seen feeding gears into the automatic loading attachment.

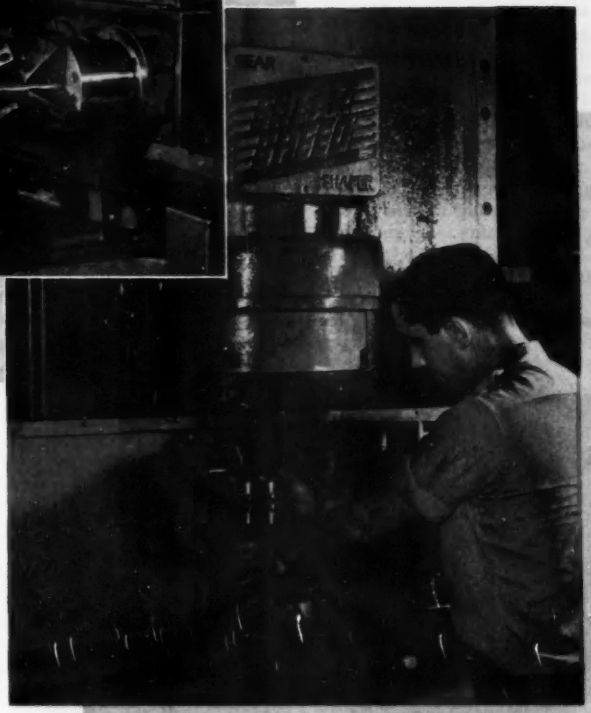
Precision Gears and Pinions For Ford's Automatic Transmission

THIS is the fifth in a series of articles devoted to production of the Ford-Mercury automatic transmission. The first article, which appeared in the July 15 issue of AUTOMOTIVE INDUSTRIES, described operations at the Warner Gear plant in Muncie, Ind., and dealt, in general, with machining of the case, drums, and gears. Methods employed at Ford's Cincinnati plant for somewhat similar operations were covered in a second article, August 1. Next, a description of assembly and test procedures at the Cincinnati plant appeared in the September 1 issue. This was followed, October 1, by an article which discussed operations on the hydraulic control parts at Warner Gear.

READERS of AUTOMOTIVE INDUSTRIES will appreciate the painstaking care required in the building of the Ford automatic transmission from the descriptions of some of the major operations in the Ford Cincinnati plant which have appeared recently. Although it is a precision job in every detail, additional emphasis necessarily has been placed on the manufacture of the variety of gears that make up the operating mechanism. Quality is maintained at every stage starting with the raw materials at the steel mill, forging practice, machining and grinding and other related details, as well as gear cutting and heat treatment.

To consider only one example of the need

Here is one of the two-spindle New Britain precision-boring machines tooled for turning and boring reverse clutch sun gears. The massive, solid carbide tool bars may be seen in the tool head at the left.



Close-up of one of the Michigan Shear-Speed gear shapers. This one is used for producing serrations on the OD of the big internal ring gear.

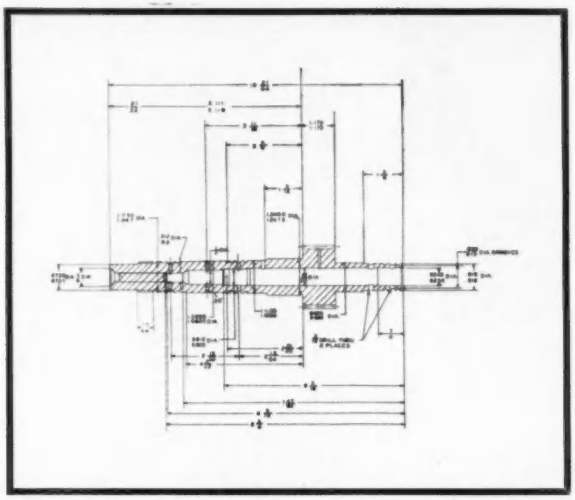
By Joseph Geschelin

for precise control, the compound planetary gear set has the equivalent of nine mating pinions which must be fitted snugly and with scant backlash within the cage, mating not only with one another but with other gears as well.

Quality control becomes a vital element in this picture, and gear cutting assumes the nature of an extremely exacting operation. As will be noted later, whether they are hobbed or shaped as a semi-finish operation, all gears are shaved in the green not only to assure excellence of finish but to compensate for the known distortion in heat treatment. In addition to the normal straight-shaving of the gears, one gear of each mating pair is crown-shaved to relieve gear teeth at the tips and thus prevent edge loading under extreme operating conditions.

Incidentally it is noteworthy that cemented-carbide tools of suitable grade are employed on the majority of steel cutting operations on most of the machines mentioned in this article.

Although this article is concerned with a sampling of some of the principal steps in the manufacture of



Drawing of front sun gear showing complexity of hollow shaft formations.

four selected gears, the process is essentially similar for related parts. Pertinent gear design data on each of these gears will be found in the table on the opposite page.

Long planetary pinions, made of SAE 4047 cold drawn steel bars, are turned, formed, drilled, reamed, etc., in an eight-spindle, 1⅝-in. Conomatic, which also finish-shaves the OD at the sixth position. The gear blank has a 3/16-in. groove in the face to separate the long and short tooth sections. Then follow two operations in New Britain two-spindle precision boring machines: facing and forming one end and rough-boring the hole; facing and forming the other end and finish-boring to 0.6861-0.6866 in. The boring operation is quite critical not only with respect to diameter but concentricity with OD as well. To assure maintenance of these dimensions the machine is fitted with rigid carbide boring bars as well as solid-carbide cutting tools.

Semi-finish-hobbing of gear teeth is done in eight-spindle Cleveland rotary hobbers, using a triple-thread hob. Work is held securely by means of an air-operated arbor. Burring of these gears and certain others is done in special combination burring and chamfering machines—Burrmaster—made by Modern Industrial Engineering Co.

Next is crown-shaving in two operations—one on the long end, one on the short end—in National Broach Model GCU 8-in. Red Ring rotary gear shavers. In the bay producing long and short pinions there are three Red Ring finishers—two for crown-shaving the long pinions; one for shaving short pinions. These machines are fully automatic in action, the only function of the operator being to load gears in the loading chute. Crown-shaving on each section is specified at 0.0003-0.0005 in.

Heat treatment is controlled to a very precise routine. Most parts, including the gears, are given a carbo-nitride treatment in Holcroft

A special adaptation of the familiar Micromatic Microsize Hydrohoner is employed for honing the bores of long and short pinions. Of two-spindle type, this machine has a magazine feed to each spindle instead of the usual rotary indexing table.

Ford Automatic Transmission Sampling of Gear Data

	Reverse Sun Gear	Long Planetary Gear	Forward Sun Gear	Ring Gear Internal	Ring Gear External
No. Teeth	33	16	27	66	59
Normal DP	14	14	14	14	10
Helix Angle	20 deg LH	20 deg RH	20 deg RH	20 deg RH	Spur
Normal PA	20 deg	20 deg	20 deg	20 deg	.....
Pitch Diameter	2.5084	.....	.....	.....	.....
Lead	21.65116	10.49758	17.71476	43.30274	.....
Addendum	0.0714	0.0904	0.0713	0.0584	0.050
Dedendum	0.0964	0.0748–0.0798	0.0965	0.0964	0.080
Crown Shave	.....	0.0003–0.0005	0.0003–0.0005	.....	.....

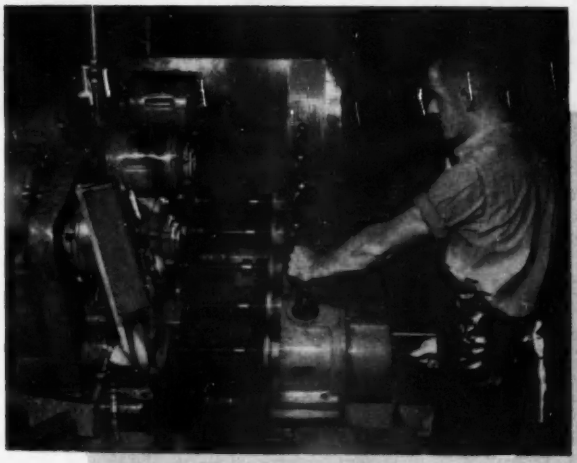
Note: On all gears maximum permissible tooth to tooth spacing error—0.0005 in. Maximum permissible involute profile error—0.001 in.

furnaces, oil quench at the furnace, then a low temperature draw. The pinions then are put through a Pangborn Roto-Blast machine for cleaning.

Finish-grinding follows—grinding an oil groove in both ends on a B-30 Arter rotary surface grinder; grinding and honing both ends, brushing teeth and chamfers in a special Hoern & Dilts machine; finish-honing the bore to 0.6876-0.6881 in. The latter operation is done in a Micromatic Hydrohoner of two-spindle type with automatic magazine feed of work to each spindle, contrasting with the indexing table feed generally employed.

The next example, the reverse sun gear, is of hollow shaft type made of SAE 5140 or 4047 steel forgings. The blank is semi-finished all over in an eight-station New Britain Model 86, double-index chucking machine; then green-ground to a tolerance of 0.001 in. on the three major diameters in a Norton 6 x 18 angle slide semi-automatic grinder. One of the basic operations on this part is that of forming centers at both ends, boring the stepped diameters, and turning the gear diameter in a New Britain precision boring and turning machine of two-spindle type. Accurate axial alignment of the 30 deg centers on both ends is imperative as they are locators for hobbing and shaving operations.

A 5 by 16 Lo-Swing lathe then is used for rough- and finish-turning two grooves, forming chamfers, facing the ends and facing the gear blank, the latter being located from the small groove. Flats are milled at the stem end in a Cincinnati No. 0-8 semi-automatic rise-and-fall milling machine. (*Turn, please*)



A unique piece of equipment, designed specifically for the Ford plant is the five-station W. F. & John Barnes gun drilling machine for drilling the front sun gear shaft. A drawing of this intricate part is shown elsewhere.

Hobbing of the 33-tooth helical gear is done in an eight-spindle Cleveland, using a four-thread hob. Shoulders, grooves, and milled flats are deburred on a Hammond buffing stand, the gear tooth edges being finished in another of the "Burrmaster" machines. Then the gear is straight-shaved in a Red Ring rotary gear finisher.

Work is heat treated by carbo-nitriding in a Holcroft batch furnace, quenched in oil in the furnace, washed, and given a low temperature draw in a Holcroft combination washer and draw furnace.

A 6 by 18 Norton semi-automatic OD grinder with automatic cycle and electric sizing control handles the grinding of four diameters and the face of the gear stem side. Surface finish on these operations is held to 30 micro-inch (rms) maximum.

The outer face of the gear is ground in a Blanchard vertical surface grinder, while each of the stepped bores is finished in separate setups in Bryant internal grinders.

The front sun gear poses an intricate problem of machining and control because, as illustrated here, a 27-tooth gear is cut on a hollow shaft some 10 21/64 in. in length with a complexity of grooves and accurately held diameters as well as a splined section at one end. It is procured as a forging of SAE 5132 steel, normalized and ready for machining with Brinell hardness of 180-207. First operation is to mill both ends to semi-finish length, and center in a J & L automatic milling and centering machine. Then the short and long ends are turned and faced in separate settings in 12 by 21 Fay automatic lathes.

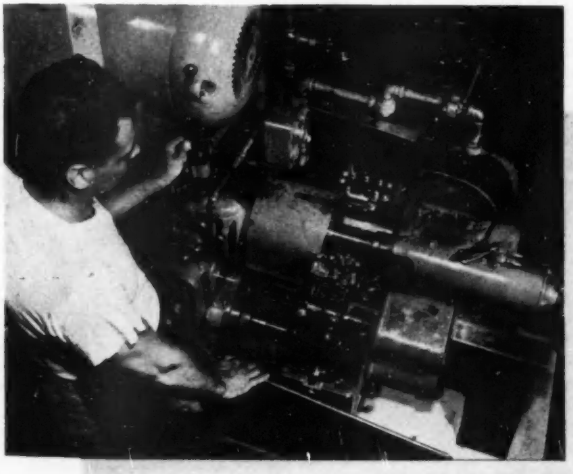
Following these machining operations the work is heat treated for stabilizing and removing residual strains, using a Surface Combustion gas-fired furnace. It is then straightened, centers cleaned, and presented to the first grinding operation — finish-grinding two diameters to serve for locating in the subsequent gun-drilling operations next performed.

The bore then is gun-drilled 0.499-0.503 in. diameter to a depth of 7.538-7.528 in. in a special W. F. & John Barnes, single-end, five-spindle gun-drilling machine. The blind end hole at the extreme end of this bore is drilled in a special inverted drilling machine made by Ford. A special Kreuger-Barnes single-end, trunnion type automatic index drilling machine is used for the gun-drilling, and rough- and finish-reaming of the smaller diameter center holes.

Green grinding of seven shaft diameters is handled in a 10 by 36 Norton Type CD semi-automatic cylindrical grinder, followed by rough- and finish-forming and turning of all grooves and semi-finish facing of both sides of the gear in a 5 by 18 Lo-Swing automatic lathe. Another major operation is the drilling of all cross holes in a 12-in., cam feed, Allen single-spindle drill.

Gear teeth now are ready for hobbing in an eight-spindle Cleveland, using a four-thread hob. Chamfering and burring follow. Then the 20-tooth involute spline is cut in a Model 715A Fellows gear shaper. Again the work is chamfered and deburred to clean up the splined end. Finally the 27-tooth helical gear is presented to a Model GCU Red Ring rotary gear shaver for crown-shaving within 0.0003-0.0005 in. Work is then washed and inspected and ready for heat treatment.

This part, too, is heat treated by carbo-nitriding in a Holcroft batch type furnace, quenched in oil, washed, and given a low temperature draw. The shaft is then straightened and after straightening is presented to a Magnaflux Magnaglo inspection machine to assure freedom from surface imperfection or cracks. Accepted work is grit-blasted in a Pangborn table type machine, centers cleaned, and teeth brushed in a Hammond buffer, ready for final grinding.



Preliminary turning operations on the reverse clutch sun gear are handled in the small Lo-Swing lathe shown in this view.

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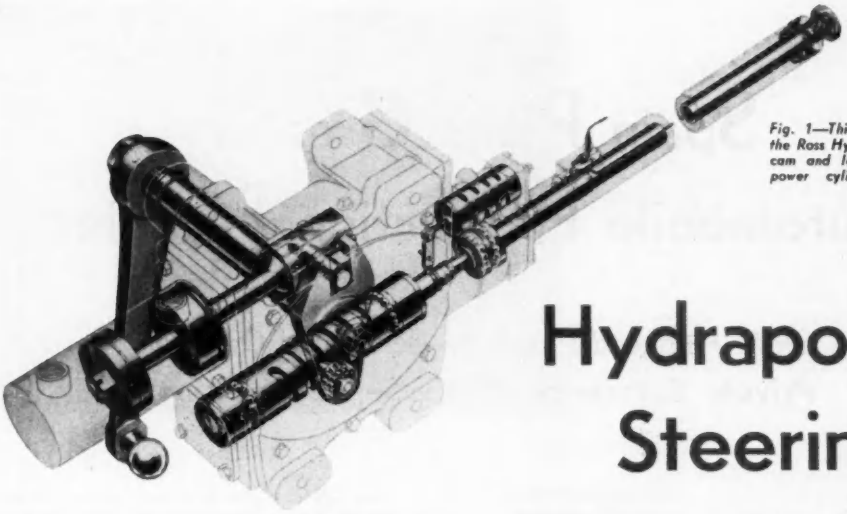


Fig. 1—This phantom view of the Ross Hydrapower shows the cam and lever gear with the power cylinder and control valve.

Hydrapower Steering

New Ross Steering Gear in Production for Military and Commercial Vehicles

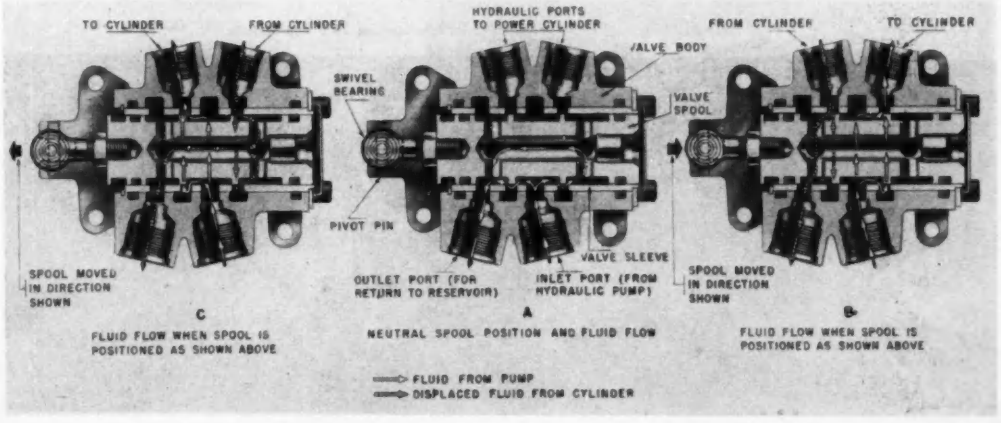
ARMED Forces vehicles as well as commercial vehicles, including off-the-highway equipment, are being supplied with a newly designed power steering developed by the Ross Gear and Tool Co. One of the features of the gear, the Hydrapower model HP70, is the universal mounting of some of the component parts which enables the gear to be used with the parts arranged in a manner most suitable to a peculiar application.

The ability of the steered wheels to return to straight-ahead position after making a turn is a valuable characteristic of this design. It is claimed that there is no lag in the hydraulic response either for power assistance or resisting shocks, so that there is no tendency to over control. Another feature is that a considerable weight saving has been effected over earlier models.

Basically, this gear is of the cam and lever type to which has been added a hydraulic power system, Fig. 1. In operation, the action of the gear is both manual and hydraulic in effect. When the cam is turned to the left

(*Turn to page 64, please*)

Fig. 2—Control valve operation is depicted by these three sectional illustrations.



Spain Plans Greater Automobile Production Facilities

State-Financed Plants to Be Turned Over to Private Enterprise When Self-Supporting

BARCELONA, SPAIN

SPAIN is now developing an automobile production program which aims at giving her almost complete independence of outside supplies. The needs of the country are great, for the total number of automobiles is less than 158,000. Of these the vast majority are old models, the average life of motor vehicles in Spain being estimated at 14 to 16 years. The mountainous nature of a large part of the country, in which the building of railroads is costly, is favorable to the automobile.

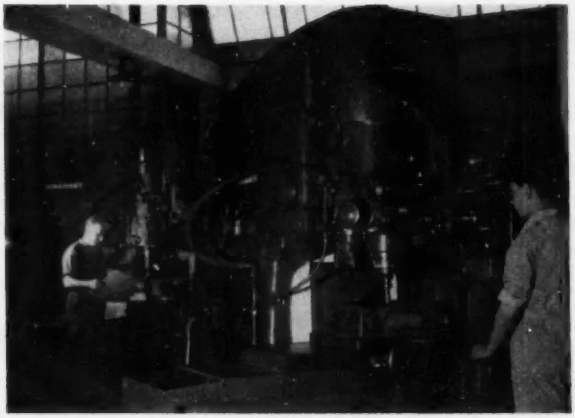
The commercial balance being adverse, imports are severely restricted, subject to Government license, and the duty in many cases being as high as 263 per cent. The present government is not favorable to the assembly of foreign cars on Spanish territory, the main objection being that in case of international difficulties, the source of supply would automatically dry up. Ford is still assembling a very limited number of trucks, but General Motors, on the other hand, has moved out.

By W. F. Bradley
Special European Correspondent for AUTOMOTIVE INDUSTRIES

The present plan is for partial nationalization of the automobile industry, the State supplying the necessary capital for plant and equipment and gradually withdrawing in favor of private enterprise as the concerns become self-supporting. Recently the Ministries of Industry and of Commerce were separated and a National Institute of Industry (INI) was formed, under the direct control of the presidency of the council. It is this Institute which is responsible for the building up of an automobile industry. At the same time a Central Automobile Technical Office (CETA) was formed to act as a research and development department for the entire Spanish industry. This office is under the general management of Engineer Wilfredo P. Ricart, who for some years was chief engineer of the Alfa Romeo Co., of Milan.

Most important of the Spanish state-controlled automobile factories is the Empresa Nacional de Autocamions SA (ENAS), producing the

This Spanish national automobile factory at Barcelona has 3500 employes.



In this section of the tool department at Barcelona are three Cincinnati Hydro-tel milling machines.

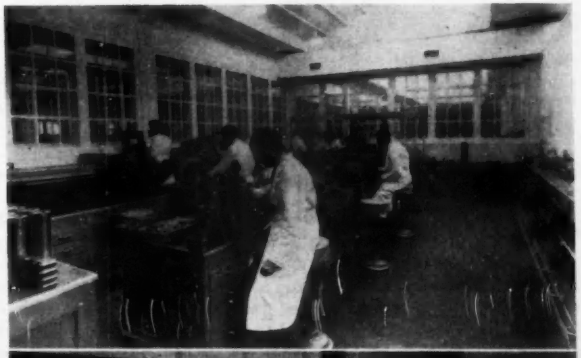
Pegaso series, and established at the end of 1946 with Engineer Ricart having technical management. Roughly, the proportions of private capital to State money is 25 to 640. When the ENAS was formed it purchased the original Hispano-Suiza shops at Barcelona, without, however, taking over the assets of that company, which remains as an independent organization.

Since then the factory has been considerably enlarged and in particular it has been equipped with precision machinery, the like of which can only be found in some of the most modern of the British aviation factories. Approximately $4,000,000 have been expended on the plant, which comprises chemical and metallurgical laboratories, constant temperature tool shops, with precision machines from the Genevoise, of Geneva, from the United States, Italy, Sweden and England. As most of these purchases were made three years ago, the present value is much higher. The reason for this emphasis on precision plant is that Spain has practically no automobile components industry and complete reliance cannot be placed on steels and other raw material supplies. Thus, there is a much closer laboratory examination of forgings and castings before and during machining operations than in most automobile factories, and Magnaflux is applied very generally to whole series of standard parts.

The Barcelona factory of ENAS is now in full production of a six-cylinder Diesel truck, also a chassisless coach using the same engine. This engine is almost entirely aluminum-alloy construction, the castings being made on the spot. This foundry also handles bronze and iron. There is a limited use of the six-cylinder Diesel for marine and electric generating sets, and the truck chassis is also used with battery-electric power.

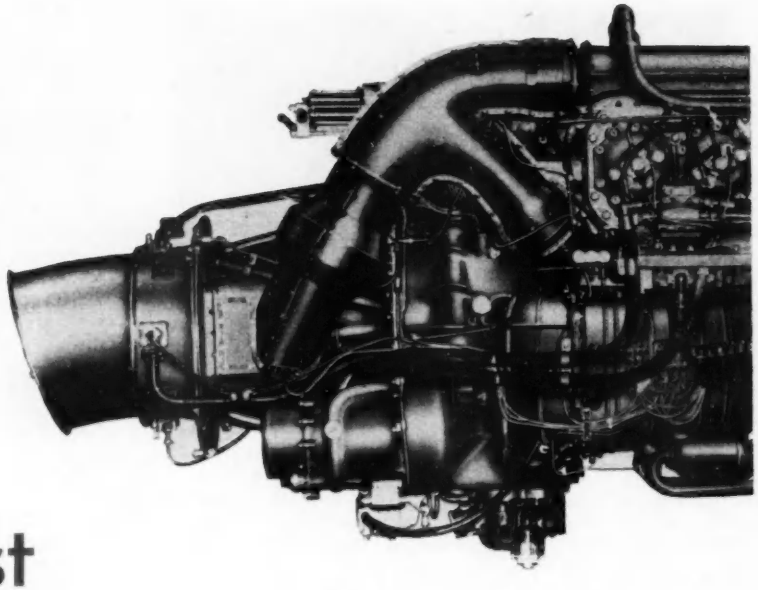
The first postwar passenger car to be built in Spain is about to go into production in the Barcelona factory of the ENAS. This is a high-grade sports model of chassisless construction, with a light-alloy V-eight engine of 152 cu in., with overhead camshafts, a five-speed transmission on the

(*Turn to page* 104, *please*)



Metallurgical laboratory at Barcelona plant. It is air-conditioned.

High precision, constant temperature shop at the Spanish national automobile factory. Shown are a Kearney & Trecker Autometric precision boring machine and two Societe Genevoise Hydroptics.



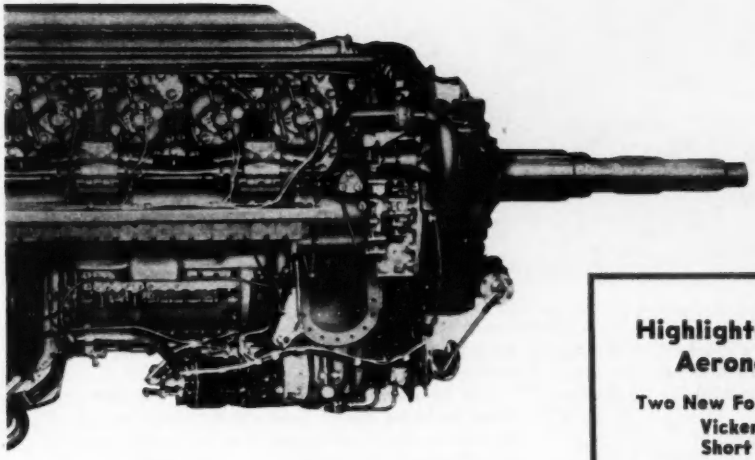
Latest British Aircraft and Engines at Farnborough Show

LONDON, ENGLAND

BRITISH aircraft manufacturers staged their annual exhibition and flying display in September at Farnborough with precision and a higher degree of technical and production interest than ever before. There were 49 aircraft in flight and 12 were static. This total of 51 compares with 50 in the first postwar exhibition, 38 in 1937 and 34 in the first show held in 1932. The average weight of the exhibited craft has increased from 7100 lb at the first show to more than 35,500 lb at this year's exhibition. This last figure is only approximate, owing to the presence of a certain number of secret types.

Representatives from 60 different countries were present, only Russia and satellite countries being absent. Military types were greater in number this year, thus indicating that Britain is really speeding up her armament program. Although they were put through their paces in the air, the public was not allowed to approach

This Vickers Supermarine 508 is claimed by the British to be the world's fastest and most powerful naval fighter. (Acme photo).



Napier Nomad compound engine, incorporating a 12 cyl horizontally opposed two-stroke Diesel and gas turbine.

By W. F. Bradley
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

Highlights at Farnborough Aeronautical Display

Two New Four-Jet Bombers—
Vickers Valiant
Short S.A./4

Two New Single Seat Interceptor Fighters—
Hawker P 1067
Vickers Supermarine Swift

Three Delta-Wing Types—
Avon 707
Boulton Paul P 111
Fairey F.D. 1

Composite Engine—
Nomad by Napier Co. Compound engine — Two-stroke Diesel and gas turbine.

Extended use of turbojets and turboprops for military and commercial planes.

most of these craft and little information was given out regarding their features and performance. In several cases production orders had been awarded before the new models had completely left the drawing board.

Gas Turbines Surpass

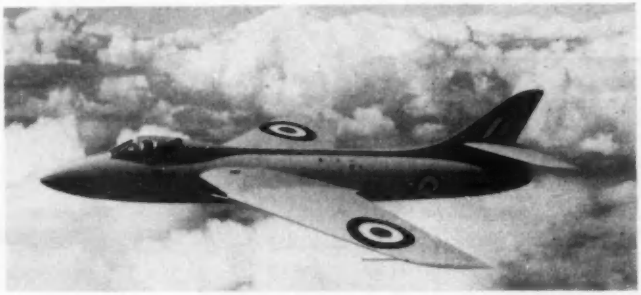
Another feature of the exhibition was the growing use of gas turbines at the expense of the piston-type engine. This year there were 21 piston engines compared with 43 at the first postwar show, and 28 gas turbines compared with five. Of these 28 there were 22 turbo-jets and six turboprops. One engine was of the compound type. There is no doubt that England is going out unreservedly on gas turbines.

Undoubtedly the highlight in the engine section was the Nomad compound powerplant, presented by the D. Napier Co. His is a 12-cylinder horizontally-opposed compression ignition engine which delivers power into one-half of a counter-rotating propeller, the engine being supercharged by an axial compressor and a centrifugal compressor in series. Exhaust gas from the engine is fed into a gas turbine, the power from which is delivered into the other half of the propeller. Two auxiliary combustion chambers are provided, in which additional fuel may be burned to provide maximum power for take-off, an auxiliary turbine being used under these conditions.

The claims for this engine are that it has extremely high thermal efficiencies with correspondingly low fuel consumptions. It burns kerosene, and fuel consumption at maximum continuous power is 0.360 lb per effective horsepower per hour. Its most economical fuel range is at 80 per cent of maximum power. The saving in weight of fuel carried makes it a most suitable type for long-range service. Power at take-off is 3000 shaft horsepower plus 320 lb thrust. Dry weight is stated to be 4200 lb, and overall dimensions are length 126½ in., width 58¼ in., depth 49¼ in. Details have not yet been revealed, but it was shown in flight on a Lincoln flying test bed.

The De Havilland Engine Co. showed the Sprite

assisted take-off rocket in which thrust is obtained by allowing a catalytic agent—in this case either sodium permanganate or calcium permanganate to react on a solution of hydrogen peroxide of 80 per cent concentration. The temperatures are low and only one fuel is used at a high-flow rate, so that the reaction chamber need not be cooled. The Sprite gives a total impulse of 55,000 lb-sec. The thrust die-away, arbitrarily quoted as from 5000 lb at nine seconds to 3000 lb at 12 seconds, is adjustable. It would be possible to adjust the unit to give lower maximum thrusts (down to 3500 lb) for longer periods.



Hawker P 1067 fighter unofficially timed at 671 mph. (Acme photo).

Snarler Bi-Fuel Rocket

A more recently announced unit in this class is the Armstrong-Siddeley "Snarler" bi-fuel rocket motor, using liquid oxygen and a water/methanol mixture. The Snarler weighs 215 lb and can be fitted in a space measuring 6 ft by 3 ft, and gives 2000 lb thrust at sea level. Unlike the solid propellant motor, the Snarler can be switched on and off at will, thus giving the fighter pilot an enormous advantage, particularly in high altitude combats. It already has been fitted in a Hawker P 1072.

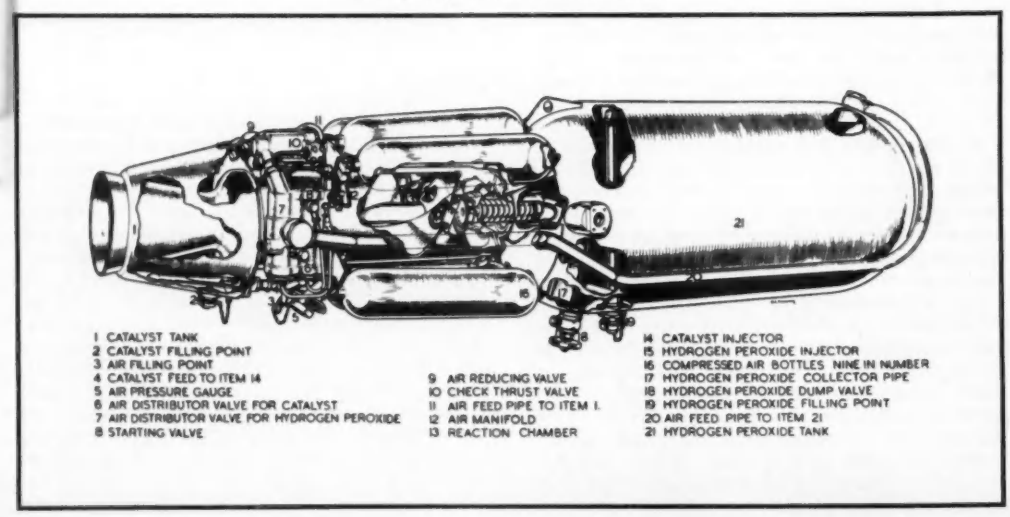
Flight demonstration was inaugurated by the Vickers-Armstrong Viscount 700, equipped with four Rolls Royce Dart turbo-propeller engines, which got off the ground with two of its props feathered. This is a 40/53 passenger airliner that will go into commercial service next year.

The De Havilland Comet, with four De Havilland Ghost turbo-jet engines, and which will be the first of its type to get into passenger-carrying service, was not presented according to schedule. The Ashton, built by A. V. Roe & Co., flew powered by its four 5000 lb Rolls Royce Nene turbo-jet engines. This aircraft first flew in August of last year, and six have been supplied to the Ministry of Supply. Then followed the Hermes 5 medium range airliner, the production version of which will have the Bristol Proteus turbo-propeller engines.

The Proteus-Lincoln was an experimental plane with the outboard Merlins replaced by Proteus turbo-propellers. Also an experimental job was the Nomad-Lincoln, with one Napier Nomad compound engine and four Rolls Royce Merlin piston engines.

(*Turn to page* 126, *please*)

Drawing of Sprite rocket for assisted takeoff.


1 CATALYST TANK
2 CATALYST FILLING POINT
3 AIR FILLING POINT
4 CATALYST FEED TO ITEM 14
5 AIR PRESSURE GAUGE
6 AIR DISTRIBUTOR VALVE FOR CATALYST
7 AIR DISTRIBUTOR VALVE FOR HYDROGEN PEROXIDE
8 STARTING VALVE
9 AIR REDUCING VALVE
10 CHECK THRUST VALVE
11 AIR FEED PIPE TO ITEM 1.
12 AIR MANIFOLD
13 REACTION CHAMBER
14 CATALYST INJECTOR
15 HYDROGEN PEROXIDE INJECTOR
16 COMPRESSED AIR BOTTLES NINE IN NUMBER
17 HYDROGEN PEROXIDE COLLECTOR PIPE
18 HYDROGEN PEROXIDE DUMP VALVE
19 HYDROGEN PEROXIDE FILLING POINT
20 AIR FEED PIPE TO ITEM 21
21 HYDROGEN PEROXIDE TANK

Getting the checkered flag is Phil Walters, winner of the Watkins Glen Grand Prix, who drove a Cunningham sports car at a record-establishing pace.

American Sports Cars Win Watkins Glen Grand Prix

By Robert T. Jackson
Perfect Circle Corp.

WHEN Phil Walters, a professional who obtained his undergraduate schooling on the Eastern dirt track circuit under the pseudonym of Ted Tappett, handily won the fourth resumption of the Watkins Glen Sports Car Classic this September 15 in an American-designed-and-built Cunningham car, he established a record average speed of 77.65 mph. John Fitch was second in another Cunningham, approximately one min, 30 sec behind the winner.

W. C. Spear was third in his Superleggera Ferrari and Briggs S. Cunningham was fourth in the third of the three Cunningham cars entered. A Chrysler-Allard was fifth and a Cadillac-Allard sixth. Cunningham, owner-manufacturer of the cars bearing his name, thus contributed mightily to the possibility of an American renaissance in road and sports car racing.

Since the Cunninghams and the Chrysler-Allard are

(*Turn to page* 134, *please*)

Photographs by Robert T. Jackson

This engine installation in one of the Cunningham cars, shows the mounting of four carburetors on the Chrysler V8 Firepower engine.

Automotive Industries
Management Conference

Company executives pause a few moments for the photographer just before opening of renegotiation conference in Philadelphia

RENEGOTIATION
Needs Salesmanship

Skillful Preparation and Presentation of Renegotiation Reports Are Important to Prove Efficient Profits. Key Executives from Philadelphia Area Discuss Defense Contracts Under 1951 Act.

WITH renegotiation of defense contracts fast becoming one of the major financial analyses confronting many companies, a management conference on this subject was sponsored September 20 by the editorial department of AUTOMOTIVE INDUSTRIES for executives in the Philadelphia area. Participating were 30 representatives from eight companies, the Tax Foundation of New York City, and AUTOMOTIVE INDUSTRIES.

This conference was the first of a series that is being planned to extend the editorial service of AUTOMOTIVE INDUSTRIES. By supplementing the information published in articles, such a meeting provides an excellent opportunity to discuss individual problems and ex-

Guest Executives at Renegotiation Meeting

E. F. Houghton & Co.
W. F. MacDonald, President
John Maisch, Comptroller

Standard Pressed Steel Co.
W. I. Kyder, Secretary
J. V. Lester, Comptroller
A. W. Scott, Advertising Manager

American Chemical Paint Co.
Raymond Naylor, Treasurer
Norman P. Gentieu, Advertising Manager

Leeds & Northrup Co.
John A. Fetterman, Chief Accountant
J. M. Plummer, Advertising Dept.

Simonds Abrasive Co.
S. S. Meyer, Treasurer
F. C. Entwisle, Assistant Treasurer
D. S. Saurman, Advertising Manager

Henry Disston & Sons, Inc.
S. T. Roberts, Assistant Vice President

Baldwin-Lima-Hamilton Corp.
Robert Doolittle, Vice President Legal Dept.
Raymond Parshall, Comptroller
Louis Griffith, Assistant Comptroller
George Walsh, Advertising Manager

Electric Storage Battery Co.
Robert Sommerville, Vice President i/c Sales
D. N. Smith, Vice President & Comptroller
W. P. Logan, Sales Manager
F. J. Cosgrove, Headquarters Accountant

Tax Foundation
Carleton H. Stevens

change experiences. In that respect the September 20 session proved extremely worthwhile. The next meeting is being scheduled for early November at Hartford, Conn.

Indicative of the widespread interest in renegotiation was the response to Kenneth G. Smith's article, "How to Protect Yourself for Renegotiation," which was published in the July 15 issue of AUTOMOTIVE INDUSTRIES. Shortly afterward a number of companies, trade associations and banks requested reprints and certain specific information. For that reason AUTOMOTIVE INDUSTRIES invited Mr. Smith to discuss further management policies for handling renegotiation under the 1951 Act.

The conference on September 20 was opened by G. C. Buzby, publisher of AUTOMOTIVE INDUSTRIES, who welcomed the guest executives. During the latter part of the program he moderated the "off the record" discussion of renegotiation problems. Mr. Smith was introduced by AI Editor James R. Custer, who explained the purpose of the conference and outlined the various renegotiation factors to be considered. As to the speaker's background it was pointed out that during World War II he was a member of the Army Signal Corps Renegotiation Panel; since then has been a financial consultant to several companies, at present is a consultant on renegotiation to several trade associations, and is a member of the board of directors of American Management Counsel, Inc., N. Y. C.

Among the factors discussed by Mr. Smith were what sales are subject to renegotiation and their segregation, pricing policies, protective measures for renegotiation, what constitutes a good written report and viewpoints of a renegotiation board.

Prove Efficient Profits

Special emphasis was placed on the importance of salesmanship in the preparation and the presentation of a renegotiation report. Salesmanship, the speaker declared, can mean the difference between the Government proving excessive profits and a company proving it has made efficient profits, since the written report represents to the renegotiation board the interpretation the management has placed on the activities of the company for the year under review. Many times this very important report is a rushed, haphazard compiling of figures and statements, he warned, and does not fairly present the contribution of the employes, research men and key executives. A summary of Mr. Smith's talk follows:

It should never be forgotten that this renegotiation report is the most important document to be prepared by management concerning the business for the year. The report should be the finest example of salesmanship the company can produce. It must convince the board the profits are not excessive for the entire year's efficient operation.

Consider Company "A" which has 1000 plant employes working 40 hours per week, 50 weeks in the year. It is not difficult to calculate that these workers

have in a year's time devoted 2,000,000 man-hours of concerted National Defense effort. Add to this the time contributed by research men and key executives of the organization and you have a mighty force in operation. In contrast a renegotiation panel in a few hours renders a determination as to the company's profits. Insofar as the owners or stockholders of a business are concerned renegotiation is a super excess profits tax reaching over and beyond any income and excess profits taxes.

company at renegotiation proceedings. The first step, regardless of the fiscal year end, is a careful segregation of sales. The best analysis is obtained through close cooperation of the sales and accounting departments.

The salesmen from their personal association and knowledge of their customers' business are in a position to furnish the accounting department with very valuable information. The regulations state that the method used to segregate sales must be fair both to the Government and the contractor.

Costs cannot be allocated until the method of recognizing sales has been selected. Bear in mind that profits may be hanging in balance whenever you say you

Automotive Industries Management Conference

Intense interest was shown during discussion of renegotiation problems. Kenneth G. Smith, renegotiation expert, is addressing the group.

Just because a company has a good profit margin does not say that it has been making excessive profits on Defense work. The Renegotiation Board is fully alive to the efficiency of one organization over another. They endeavor to reward the better operating contractor with a greater retention of profits. The only way panel members can judge who is more efficient and therefore entitled to a higher profit margin, is through an analysis of the information submitted to them.

During World War II profits considered to be excessive and recaptured by the Government totaled approximately $11,000,000,000. There is little doubt in the minds of well-informed economists that more than one company contributed to this sum as a direct result of poor preparation and presentation of information concerning its war efforts. Many companies will make donations to a similar sum for no other reason than the lack of a good report.

Steps to Prepare for Renegotiation

Let us consider how to prepare for renegotiation, how to write the report and who should represent the

don't know how to apportion costs and therefore are spreading all expenses on a sales ration basis.

Facts are the background of a good report. The accounting schedules are very essential.

Always keep before you the fact that renegotiation came into being to correct inequities in pricing. A contractor who in the face of increasing material and labor costs is able to reduce prices should bring this out clearly in his report.

Price Reductions

Price reductions are renegotiation insurance as they are concrete proof that the profits for the year are not excessive profits—they are efficient profits.

Every executive handling renegotiation should have before him either under the glass top of his desk or mounted before him the factors listed in the Act. A superior report for the board's consideration should contain conclusive information as to the company's outstanding efforts along these lines. The factors to which the board gives consideration in determining the excessive profits of contractors are:

(*Turn to page* 118, *please*)

METALS

Copper Industry Wants Ore From Government Stocks; Price Increases on Tin and Lead Are Expected Soon

By William F. Boericke

Copper Shortage Critical

The loss of 40,000 tons of new copper production resulting from the Garfield strike and the two-week work stoppage at the principal copper mines and smelters that followed has made the copper shortage more critical. Kennecott officials declare that the shutdown cost their company alone 24,000 tons of copper of which 10,000 tons cannot be recovered. The leading copper and brass fabricator has asked for release of an additional 50,000 tons from the stockpile to relieve industry because of the shutdown. This proposal finds scant favor in Washington where it is declared that the stockpile must not be used to finance industry.

Copper imports, already off 25 per cent from the monthly average in 1950, will be even lower in September because of the dock strike in Chile that held up shipments for two weeks. NPA has been trying desperately to bring in more copper without success. Under a recent arrangement, the United States gets 80 per cent of the total Chilean production at 27½ cents a pound. The Chilean Government reserves the remaining 20 per cent, about 6500 tons a month at current production rate, to sell in non-Communist markets at the best price it can get. Early in September the Chilean government was getting about 54 cents a pound for its reserved share. If it could continue to sell the metal at this lofty figure, the Government would realize about $50 million extra a year. It is perhaps unnecessary to add that not a dollar of this premium goes to the American-owned copper mines, nor to observe that the Chilean Government won't sell its reserved share to the United States for 27½ cents a pound as long as it can get more from European buyers.

Output Off

August copper statistics disclosed that domestic production had dropped to 68,700 tons, the lowest monthly output for the year. It is unlikely that the output in September will be any larger because of unsettlement from the strike. Custom smelters delivered 105,000 tons to fabricators in August who in turn shipped 122,500 tons to their customers. This reduced their stocks to 249,000 tons or about 53,000 tons less than a year ago. Producers' stocks at 70,800 tons were hardly more than two weeks supply at current shipping rates.

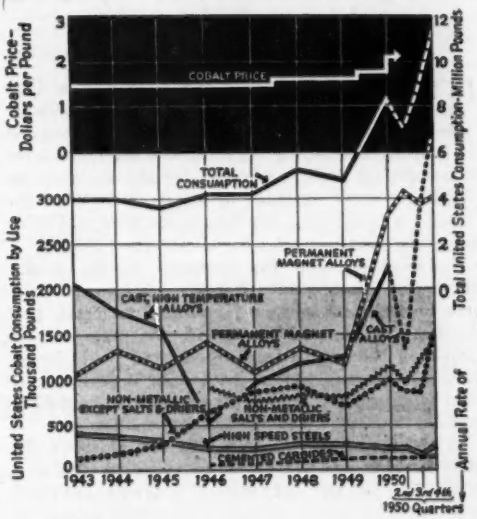
It was announced that Defense Materials Procurement has agreed with two leading copper producers to buy new copper production from them at 22 cents a pound if the metal could not be sold to other purchasers at a higher price. Inasmuch as this new output will not be available before 1953-54, this action by the Government agency suggests a floor price of at least 22 cents for the next three years.

Deliveries of copper scrap to the primary smelters have been discouragingly small and have averaged scarcely half the monthly average of 1950. Brass and bronze ingot makers have faced almost complete shutdown because of scrap shortage. Scrap dealers have not wanted to sell under present ceiling prices and labor shortage has hampered energetic collection of old scrap. There is little reason to hope that scrap will move more freely to the smelters so long as canny dealers continue to believe their supplies constitute capital assets that will bring a better price later on

Price Increase for Lead

Lead and zinc markets have been unsettled with belief prevalent that an advance in ceiling prices for both metals would be shortly forthcoming. Lead especially has been in short supply. The recent strike at the smelters caused a loss of about 12,000 tons of production and a fire at the International Smelting Company's plant in Utah will reduce output 3000 tons a month for the next 90 days. Canadian zinc and lead producers withdrew from the market late in September and declared they would make no further sales in the United States until prices were increased. While

(*Turn to page* 114, *please*)



Consumption and Price of Cobalt

River skyline of Detroit, scene of 33rd National Metal Congress and Exposition, and first World Metallurgical Congress.

International Metal Sessions at Detroit

THIS year the Thirty-Third National Metal Congress and Exposition are being held simultaneously with the first World Metallurgical Congress at Detroit. Sponsoring organizations for these three events are the American Society for Metals, American Welding Society, Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers and the Society for Non-Destructive Testing.

With "Production for Defense" as the theme, through scheduled seminars, lecture sessions and meetings on technical subjects pertainting to metals production, treating and processing, the programs are providing National Metal Congress and World Metallurgical Congress visitors with daily opportunity to hear vital technical subjects discussed and analyzed by some of the world's leading engineers and teachers.

A metals seminar, sponsored by the American Society for Metals on Oct. 13 and 14, opened the National Metal Congress and was followed by five days of meetings featuring technical papers. Technical sessions of the Welding Society, AIME and Non-Destructive Testing Society also were held during the week with large attendances.

The National Metal Exposition opened Oct. 15 at the Michigan State Fair Grounds in Detroit with over 400 companies and organizations participating. New products and new equipment exhibited there are described in this issue of AUTOMOTIVE INDUSTRIES beginning on the next page. A large area in one of the buildings at the exposition is the scene of a metallographic exhibit, the sixth to be held by the ASM.

At the annual dinner of the American Society for Metals the presentation of that group's three top awards will be the feature. The Sauveur Achievement Award, established in 1934 by the ASM, will be presented to Dr. Robert F. Mehl, head of the department of metallurgy, Carnegie Institute of Technology, for his metallurgical achievements. Dr. Paul D. Merica, executive vice-president, International Nickel Co., will receive the ASM Gold Medal and Gwilym A. Price, president of the Westinghouse Electric Corp., the 1951 ASM Medal for the Advancement of Research.

The World Metallurgical Congress is expected to attract 35,000 persons from many parts of the world. Glen C. Riegel, chief metallurgist of the Caterpillar Tractor Co., will lead the foreign and American experts in the technical sessions. They will consider eight major industrial problems which ASM President Walter E. Jominy has outlined as follows:

1. The need for uniform terminology and research techniques among metal scientists of the free world;
2. The lack of a system or agency to transcribe and translate data from one nation to another.
3. The need for increased means of give-and-take between scientists engaged in basic research "especially where international exchange of basic research ideas would not endanger national defense."
4. The need for accurate knowledge of metal shortages according to countries, and the means of relieving them.
5. Insufficient knowledge of the effects of nitrogen

(*Turn to page* 67, *please*)

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 60

Booth G-230 and G-339

MS-1—Automatic Press Loader

A Lodac press feeder will be displayed by Magnaflux Corp., Chicago, Ill. With the Lodac feeder, mechanical fingers pick up parts after first draw and feed one or more consecutive redraw presses at speeds up to 1200 parts per hr. Similar fingers remove the parts from the press to feed them on another conveyor to feed further press operations.

Magnaflux press feeder, the Lodac.

The complete operation cycle is set by the speed adjustment of the Lodac press feeder. At the proper point after loading, the press is tripped by the feeder, with either electric or air triggering. If the part is not removed from the die, a "safety" circuit stops feeder and press. However, if parts are not being loaded to the die, a memory circuit will continue to operate the press and feeder thus avoiding shutdown delays. After any shutdown, the memory circuit starts the Lodac at the point of the cycle where it was last interrupted. The mechanical fingers are specially designed for parts to be handled, and are held in special chucks for quick change between press runs.

Booth D-309

MS-2—Steam Gun

A steam gun, the Oakite solution-lifting steam gun, model 502, will be featured by Oakite Products, Inc., New York, N. Y. The gun, for use in heavy-duty steam cleaning operations, is designed for use where range of operating pressure is 50 to 100 psi, with minimum boiler rating of 25 or more hp recommended.

The gun, 7½ ft long and weighing 15¾ lb, is equipped with two cast aluminum spade-type insulated handles. Forward handle remains stationary, while rear handle turns and rotates gun for cleaning in hard-to-reach locations. A safety feature is the reinforced-rubber apron backing up the steam valve and other hot fittings to protect the operator from contact burns. A swivel coupling is used for the steam hose connection. Gun is equipped with precision-machined seamless steel nozzle,

Oakite steam gun, model 502

15/16 in. I.D. and inner jet. A special flat nozzle is also available where wide-angle spray cleaning action is desired. Control valves furnished with the gun are ¾-in. globe valve for steam and a ¼-in. globe valve for solution control.

(*Turn to page* 52, *please*)

News of the Machinery Industries

Industrial Trucks

Industrial power truck manufacturers are having difficulty in placing orders for steel, according to industry spokesmen. Some companies have been unable to place part of their steel orders for the fourth quarter of 1951 and for subsequent quarters. Companies have complained that first, second, and even third quarter 1952 orders are being returned by the steel mills.

Throughout industry in general, some duplicate orders for steel have been placed with steel mills. These orders have caused, in some areas, an artificial steel shortage. A major problem involved is in finding where duplicate orders have been placed; when found, they can then be readily eliminated. Several of these duplicate orders, however, have been recently located, and according to a spokesman for the industrial truck industry, part of the eliminated orders will be replaced by original orders from industrial truck producers. This will definitely assist that industry, but it is not a cure-all for its steel troubles.

Some firms have reported that uncompleted power trucks were piling up in their plants due to a small parts shortage. One spokesman stated that nine to 12 months are required for the delivery of bearings. What the manufacturers would like to have is an NPA order permitting them an area in which to operate outside of DO-rated orders.

Employment Rise Expected

According to the latest report from the Office of Defense Mobilization, employment in the machine tool industry is expected to increase by more than 50 per cent over the May, 1951, level of 75,600 wage and salary workers by the third quarter of 1952.

After meetings with representatives of labor and management, the Department of Labor's Defense Manpower Administration requested that regional

(*Turn to page* 138, *please*)

What's NEW AT THE NATIONAL METAL SHOW — DETROIT October 15 to 19

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 60

(*Continued from page* 51)

Booth F-426

MS-3—Copying Machines

Recent development in Copyflex machines, office models 12 and 20, will be shown by the Charles Bruning Co., Inc., New York, N. Y.

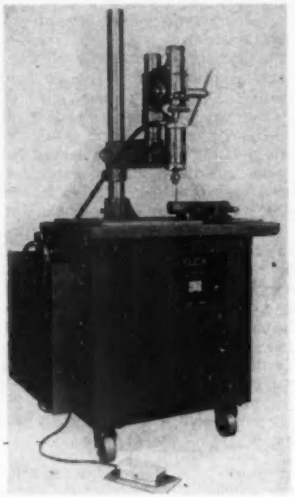
Model 12 has been designed primarily for small business and industrial offices. It is mobile and can be plugged into the nearest electrical outlet. This model makes copies up to 11 in. wide at a speed of from zero to 24 fpm. A stepless, variable speed transmission is utilized. Another feature is the built-in two roll developer for film masters. The office model weighs 488 lb, is 29½ in. wide, 50 in. high and 28 in. deep. It is powered by a 1/16-hp motor and the light source is a 940-watt mercury arc lamp.

Copyflex model 20 is designed for use where a larger printing area is needed. This new model makes prints up to 46 in. wide at speeds up to 95 ipm. It has features similar to model 12.

Booth G-239

MS-4—Electron Drill

An Electron Drill, the M-7 Tapmaster, for the removal of broken taps, drills, reamers and studs, is the most recent development of the Elox Corp. of Michigan, Clawson, Mich.



Elox Electron Drill, the M-7 Tapmaster.

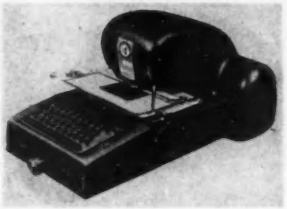
The M-7 Tapmaster employs an electrode—hollow copper alloy tubing available in various diameters—which is chucked into the disintegrating head and held firmly by a collet. A coolant is pumped through the hollow electrode to wash away particles of metal as the electrode cuts its way through a metal workpiece.

It allows 28 in of work table clearance and the adjustable drill head may be reversed to give five ft of work clearance from the floor. A back break adjusts for corner drilling and drilling holes at any angle up to 45 deg. Holes can be drilled from 0.040 in. to one in. and larger in hardened dies within 0.010 in.

A complete, self-contained unit, the M-7 Tapmaster has a two kva rating.

Booth H-258

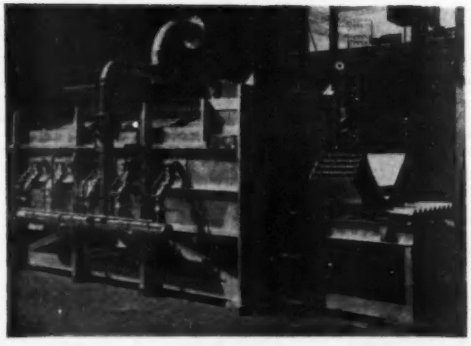
MS-6—Metal Marking Typewriter



For detailed marking of name plates, Cadillac Stamp Co., Detroit, Mich. will exhibit an electrical metal marking typewriter, the Automark. The same type intaglio marking can be done on materials other than metal. As type sizes are interchangeable, any size wheel can be used. This machine is said to mark clearly on steel (before hardening) up to ½-in. thick.

Booth G-245

MS-5—High Heat Forge Furnace



Holcroft & Co., Detroit, Mich., will feature descriptive material of newer furnace installations such as the one shown here. This high heat, rapid heating forge furnace has a rated capacity of 6000 lb per hr based on loadings of approximately 135 lb per sq ft of hearth area. It is fired with 10 high pressure burners controlled in one zone. The loading device is adjustable for various sizes of billets.

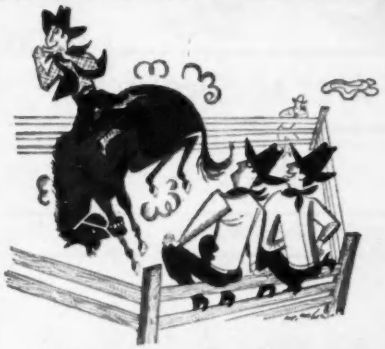
Booth C-127

MS-7—Welding Positioner

On exhibition from Aronson Machine Co., Arcade, N. Y., will be a welding positioner featuring precision rotation and fast positioning. This model 21 positioner has a 6000-lb load capacity with a rotation drive capacity of 25,000 lb-in. Tilt capacity is 6000 lb with the center of gravity six in. above the table surface. Elevation capacity will handle any load within the maximum limits imposed for tilt and for rotation.

A two-hp motor is used for table ro-

(*Turn to page* 54, *please*)



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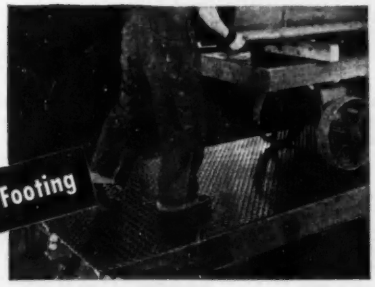

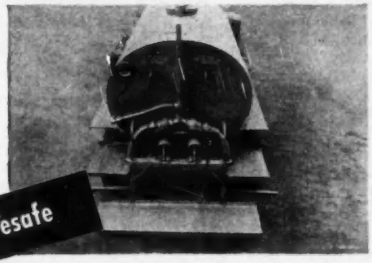

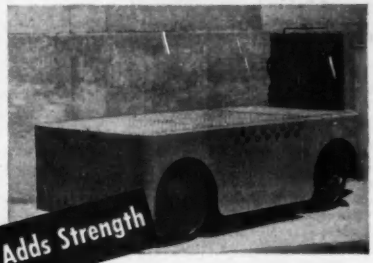

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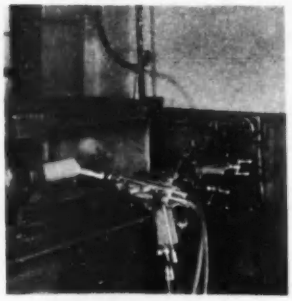
(Continued from page 52)

tation. The table can be rotated at a constant speed of four rpm for quick positioning or at a selected infinitely variable speed from zero to 2.73 rpm. Table size is 24-in. diam. Power needed for tilt and elevation is provided by a three hp motor. The table can be tilted at a rate of six deg per second. Maximum elevation is 24 in. and the speed rate is 1.6 ips.

Booth C-243

MS-8—Gun for Spray Welding

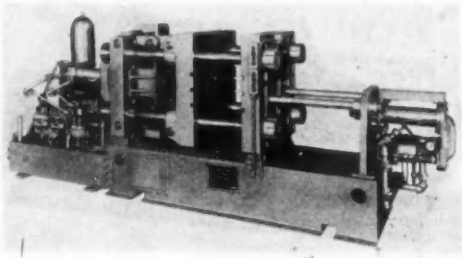


Wall Colmonoy Corp., Detroit, Mich., has recently placed on the market the model B Spraywelder for spraying an overlay of metal on metal components. The gun uses powdered hard-facing alloys and a uniform deposit of any thickness up to 0.050 in. may be obtained with that material, according to the firm. Four valves are used in the gun, two of these—located on the handle—are for oxygen and acetylene control, while the other two—located on the side—control the propellent air and the rate of powder flow.

Booth A-122

MS-9—Die Casting Machine

Model HP-37, a recently designed machine for the production of aluminum, brass, and magnesium die castings, will be displayed by the Kux Machine Co., Chicago, Ill. Completely hydraulic in operation and electrically controlled, the movement of the machine through its complete die casting cycle with each phase of the cycle automatically timed and controlled.



Kux die casting machine, model HP-37.

Having a die space of 26½ in. by 20½ in. between the tie bars, this machine has a die locking pressure of 600 tons. Metal is injected into the die under pressures of up to 25,000 psi. Injection speed can be controlled.

Although a maximum of 14½ in. of die opening is built into the machine, this die opening can be decreased for faster operating speeds when shallow castings are being made. Featuring a double end motor operating two 1000 psi hydraulic pumps, the hydraulic system is self-contained at the back of the machine.

A built-in pressure multiplier automatically increases the injection pressure during the end of the plunger stroke.

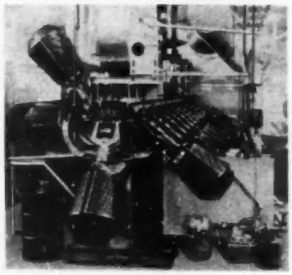
Booth D-330

MS-10—Barrel Plating Machine

Development of a full automatic barrel plating and processing machine, the Stevens Super E, was announced recently by Frederic B. Stevens, Inc., Detroit, Mich.

The Super E was developed primarily as a supplement to the Stevens model C machine in installations where requirements call for plating and processing in large volume bulky metal parts not normally handled by the model C.

Basically, the Super E is a continuous rotating barrel-type machine. Barrels revolve continuously through the entire cleaning, plating, rinsing and drying cycle. Barrels are much larger, however, in the new machine than those of the Stevens model C units.



Stevens barrel plating machine, the Super E.

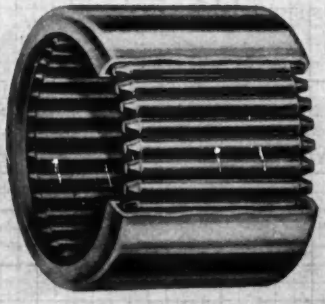
Operation of the new machine is entirely automatic. The only manual process required is the loading of the barrels at the beginning of the plating cycle and this can be eliminated through the application of a mechanical loader offered by Stevens as auxiliary equipment. Because of the nature of the machine, it fits in ideally in modern materials handling installations where mechanical conveyors move work pieces through the plant.

The Stevens unit can be installed as an integral part of the materials handling system.

The Super E is not a standard-sized unit. Models can be ordered in any size within practical economic limits.

(*Turn to page* 68, *please*)

...with plenty to spare



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E-68—Automatic Router and Skin Mill

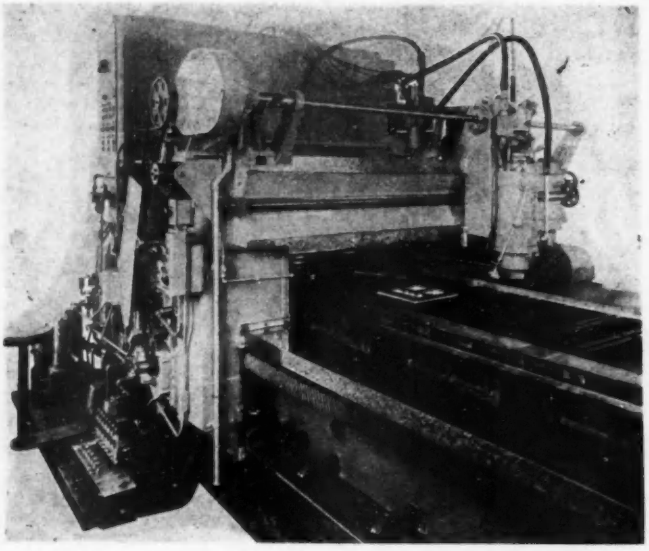
Onsrud Machine Works, Inc., Chicago, Ill., has just brought out the Onsrud InvoMill, an automatic, electronic-controlled power feed router and skin mill.

The InvoMill is another major advancement by the company in designing and engineering machinery for the production of aircraft parts. It permits routing of thick stocks of aluminum and other non-ferrous metals. It is of particular importance in the making of grids which hold gas tanks and other parts inside aircraft wings.

A 30 hp motor supplies power for routing aluminum stock of one in. or more in thickness.

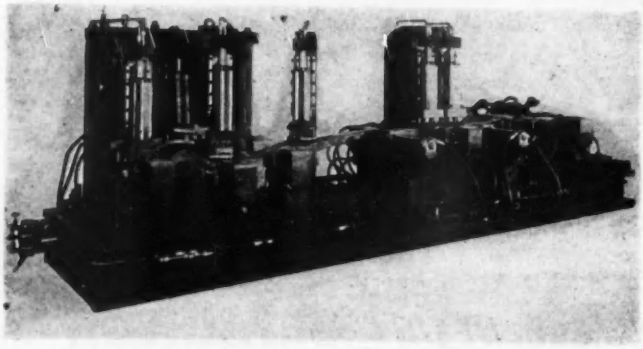
The Onsrud InvoMill also acts as a dual-purpose machine, handling skin milling of large aluminum pieces used to form wings. A 40 hp 5400 rpm direct-driven, liquid cooled motor, mounted on the cross rail, provides the power necessary for tough milling work. Both motor and cross rail may be tilted to varying degrees providing a combination of angles, as desired.

Three table widths, 72 in., 84 in., and 96 in., are available for routing or skin mill applications with bed lengths furnished in multiples of 15 ft sections plus seven ft for conveyor.



Onsrud automatic, electronic-controlled power feed router and skin mill, the InvoMill.

E-69—Hydraulic Metalworking Equipment



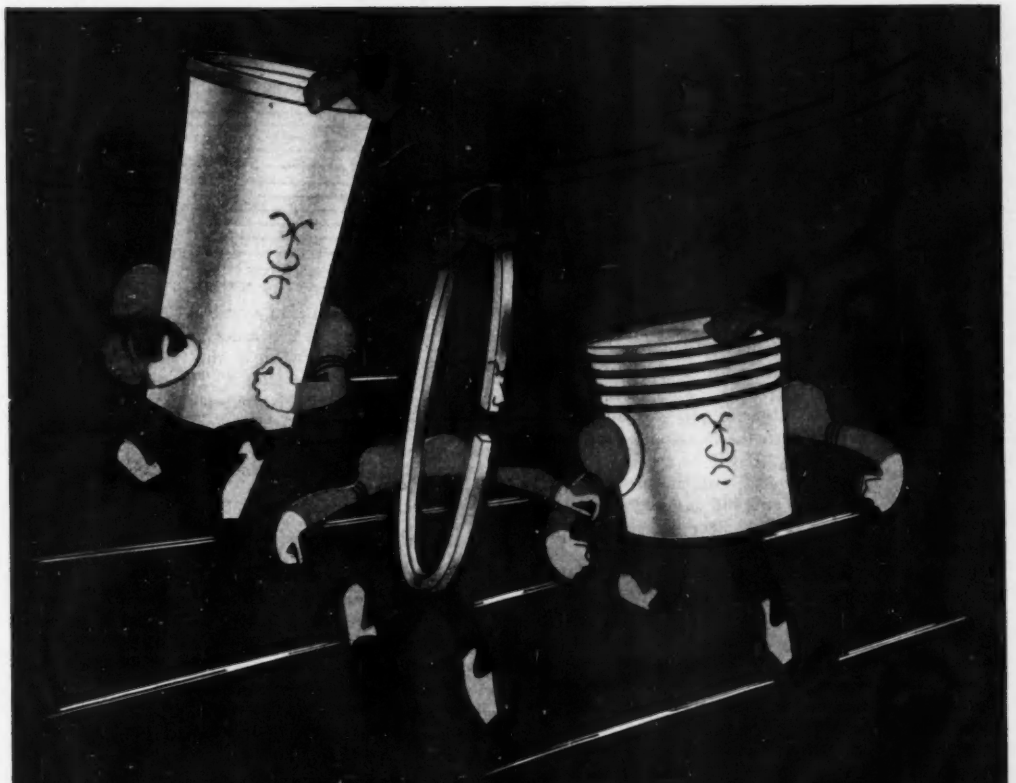
This 16 unit Danly hydraulic machine pierces the holes in the flanges and web of automatic frame side bars in one simple operation. The action of each cylinder features automatic hydraulic blankholding and stripping action.

For the piercing and sizing of holes, and for many other special operations, Danly Machine Specialties, Inc., Chicago, Ill., has announced the manufacture of a line of hydraulic metalworking equipment.

Originally patented by the Mueller Engineering Co., Dearborn, Mich., these hydraulic machines are made for applications in the automotive and aircraft industries. Typical operations are the simultaneous piercing of all holes and the trimming of automotive frame members, production riveting assembly operations on automotive frames, and producing accurately pierced holes and related assembly operations for jet engine components.

This range of applications is said to be due to the special features contained

(*Turn to page* 156, *please*)



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By ROBERT McLARREN

Fantastic Budget

The only thing really fantastic and terrible about the new Air Force budget is its size. Congress has virtually given the Air Force a six billion dollar blank check to produce these fantastic new weapons, a sum of money quite beyond even the imagination of a productively-employed citizen. It will be recalled that the wartime Manhattan Project, which produced the atomic bomb, cost only two billion—and the entire World War II Boeing B-29 bomber project cost only an equal amount. It is quite beyond comprehension what the Air Force has in mind on which it can spend six billion dollars in addition to its regular fiscal '52 procurement program.

While this reporter is by no means privy to Air Force secrets, his discussion of new weapons possibilities with informed officers and industry engineers indicates that there is nothing on the immediate horizon of a nature radical from the existing trends of development. This excludes atomic energy programs, of course, but so, too, does this six billion dollar price tag. The inevitable conclusion seems to be that the USAF is building itself the world's mightiest hedge against any Congressional complacency next year when Korea and other international threats might conceivably have subsided. One thing is certain, however, and that is six billion dollars thrown at the aircraft industry today wouldn't deliver one additional airplane —or weapon—within the next two years, so burdened are the production expansion programs.

Matador Only Step

This is not to say that the guided missile is not rapidly approaching fruition, after six years of tremendously expensive work. First tactical guided missile weapon to reach quantity production and squadron assignment is the Martin Matador. Powered by a conventional turbojet engine, this new weapon weighs about 6 tons and is capable of delivering its destructive load on a target 500 miles away. As such it is a considerable improvement on the vaunted Nazi V-2 rocket missile, which could not reach out further than 185 miles. Although definitions are tedious, the Matador is most-nearly a "pilotless aircraft" as distinct from a "guided missile" and might be compared quite accurately to a Lockheed F-80 jet fighter with the pilot removed and a warhead mounted in the nose. In both cases, the weapon flies in level flight at comparatively low altitude and at a speed of about 600 mph, easy prey for defending fighters and anti-aircraft gunners. The missile, in contrast, screams down from an altitude of about 200 miles and is moving at several thousands mph when it hits its target—virtually impervious to defense efforts. The contrast is apparent, but the Matador is that all-important first step in providing a useful equipment for the complementing of active ground crews and the development of tactical doctrine for the function of such an organization.

Turbojet Maturity

The news that the Pratt & Whitney J42 "Turbo Wasp" engine, used in the Grumman F9F Panther jet fighter, has been officially authorized at time between overhauls of 1000 hr signals the arrival of this engine at the long-time goal of equal reliability with the 40-year-old piston engine. Thus, the 10-year development period of the turbojet, during which it was correctly characterized as a temperamental, short-lived, unreliable and—above all—expensive engine, can now be said to have come to a close and the engine is now a full partner in every respect with its older piston counterpart. The pulsejet and ramjet are still in the laboratory research stage (despite wartime production of the former in the Nazi V-1 "buzz bomb"). The rocket motor, oldest form of mechanical propulsion, seems destined to remain in its technological swaddling clothes for many decades in the future.

The Helicopter Too

Also entering its stage of maturity is the helicopter, which now costs no more than a conventional fixed-wing aircraft — providing production quantities are comparable. Frank Piasecki, in a recent lecture, stated that a multi-seat passenger helicopter can be produced at a cost of about $12,000 per seat, whereas the initial investment in a Convair Liner is $12,500 per seat and a Boeing Stratocruiser about $20,000 per seat. While Piasecki was referring to a 10-seat helicopter selling for about $120,000, veteran helicopter designor Igor Sikorsky says that he knows of no technical limitation that would prevent construction of a 50- or even 100-seat transport helicopter. The rotating-wing machine has fully won its spurs on the scores of utility and reliability and the clearing of this final hurdle of cost means that the helicopter is now a mature brother to the fixed-wing aircraft in every respect.

(*Turn to page* 110, *please*)

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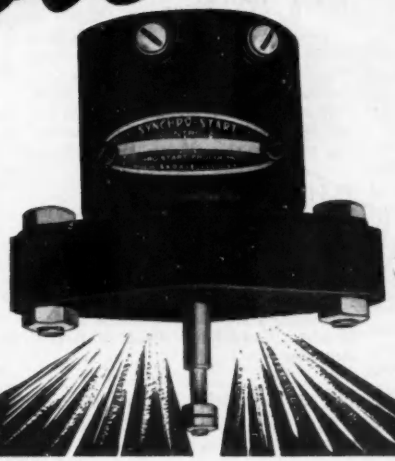
Solenoids



The Synchro-Start Solenoids are small and ruggedly constructed in a dust and splash proof case. They are used for operating throttles, fuel pump racks, chokes, anti-dieseling devices and controls.

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Shipping Weight—3 pounds 10 pound pull with ½" stroke

Current Consumption—220 W pulling, 6.5 W holding
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D-113 Oscillograph

Consolidated Engineering Corp. — The 5-114 recording oscillograph is the subject of a fully illustrated technical bulletin, 1500 B.

D-114 Fusion Welding

International Nickel Co., Inc.,—A 44-page booklet on the fusion welding of nickel and the high nickel alloys has just been published.

D-115 Glass Fiber

Fiber Glass Div., Libbey-Owen-Ford Glass Co.—Specifications for the yarns and superfine fiber glass to be manufactured by the new Fiber Glass Div. factory at Parkersburg, W. Va., are fully outlined in a pamphlet entitled "Reinforcements" now being distributed to the trade.

D-116 "O" Rings

The Arrowhead Rubber Co. — Just made available is an "O" ring data sheet. By means of this form, the firm is offering the technical advice of their "O" ring engineering specialists to designers faced with any problem involving the use of this type seal.

D-117 Materials Handling

Clark Equipment Co.—Efficient handling of raw and finished materials, their proper storage, and how modern materials handling machines can expedite manufacture to cut costs, save time and money, is the theme of the booklet, "Basic Facts About Materials Handling."

D-118 Materials Handling

Yale & Towne Mfg. Co.—A 24-page booklet titled "The How Book of Cost Cutting Materials Handling" is now available.

D-119 Facilities

Charles T. Brandt, Inc. — Recently released is a four-page illustrated folder describing the firm's facilities for mass production of defense prime contract and sub-contract work.

D-120 Machine Accessories

Portage Machine Co.—Literature is offered on new rotary tables and angular milling attachments for milling machines.

D-121 Carbide Tools

DoAll Co. — An eight-page catalog features a new line of standard carbide single point tools.

D-122 Liquid Level Controllers

Minneapolis-Honeywell Regulator Co. —Specification sheet no. 412-2 covers internal float and external float cage liquid level controllers used to maintain liquid level in surge tanks, stills, towers, feedwater heaters, etc.

D-123 Locking Nut

Security Locknut Corp. — Specifications and egnineering information on Locknuts are included in pamphlets which are available.

(*Turn to page* 103, *please*)

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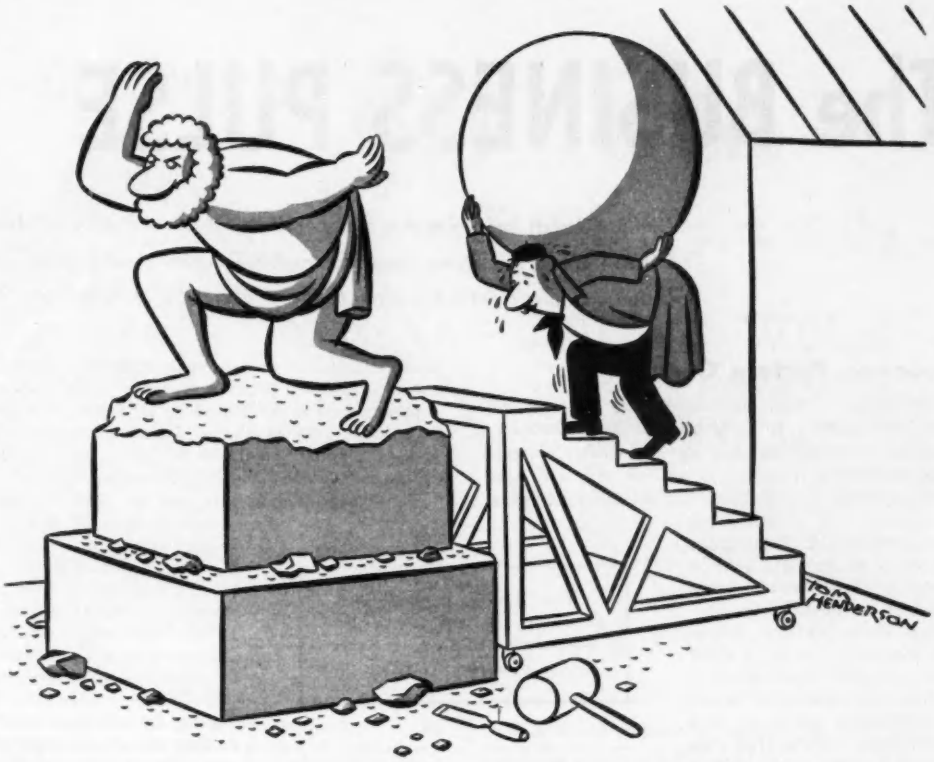

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The BUSINESS PULSE

Civilian Goods Industries Are Hampered by the Short Supply of Metals While Defense Industries Report Favorable Economic Conditions. Total Defense Employment Is Expected to Reach Eight Million People by 1953.

Economy Pattern Clearer

The sharp drop in business activity in June and July now appears to have been of brief duration, although accumulating data for September suggest that the rate of recovery in August may not have been sustained. The Federal Reserve index of industrial production rose 2.3 per cent from July to August, and the index of business activity compiled by the Guaranty Trust Co. advanced by approximately three per cent, bringing the index to the highest level recorded since January of this year. Industrial output in September, according to a preliminary report from the Federal Reserve Board, showed little change from the August figure.

This Survey Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

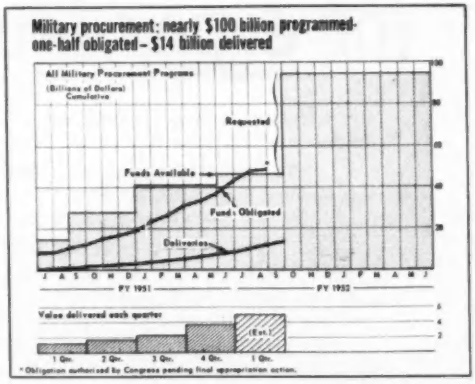
The pattern of activity in an economy oriented on a semi-wartime basis is becoming clearer. In general, basic industries related to the defense effort report the most favorable conditions. Steel production, electric power and petroleum output, the machine-tool industry, and industrial construction are running at or above last year's levels, while industries concentrating on civilian goods report less favorable comparisons. Available figures for residential construction, automotive output, furniture, and electrical appliances show declines on a year-to-year basis attributable, in part at least, to materials allocation and perhaps to consumer-credit regulations.

One indication of the slightly stronger demand situation is found in recent price trends. The Guaranty Trust Company's wholesale price index, after declining for six consecutive months, advanced 1.2 per cent between mid-August and mid-September. Indices compiled by the Bureau of Labor Statistics indicate that wholesale commodity prices in general held firm during the same period, suggesting that markets have by now discounted to a large extent the factors contributing to previous declines.

Inventories Decline

Of equal relevance is the fact that the increase in inventories, except those of durable-goods manufacturers, ceased in July. Total stocks of wholesale and retail dealers, as well as manufacturers' holdings of nondurable goods, declined. Business inventories altogether rose only $200 million, as compared with an increase of $600 million in June and continuous increases ranging from $1.3 billion to more than $2 billion each of the preceding 10 months.

Bank loans display many of the same tendencies shown by business as a whole in the past quarter, suggesting both the current high level of activity and the temporary midsummer setback. On September 12 total commercial, industrial, and agricultural loans extended by reporting member banks stood 29 per cent above the comparable figure a year ago, reflecting mainly a considerable increase in short-term inventory and working-capital loans. Between June 13 and September 12, however, loans increased only $757 million, as compared with an average advance for comparable periods of $1.2 billion during the postwar years 1946 to 1950.



From the Third Quarterly Report to the President by the Director of Defense Mobilization

The important question in the minds of many retailers and manufacturers continues to center about the possibility of reviving consumer demand. The (*Turn to page* 140, *please*)

Bus Drivers Get tired — when they do part of the horse's work

In the days of that ancient ancestor of the bus . . . the glittering omnibus . . . when horsepower had four legs and was fueled with oats, drivers did not steer vehicles. They guided the team and the animals supplied the work of turning.

Today with buses many times heavier than any of grandfather's omnibuses, the driver too often has to supply the physical effort. Power to turn must come from his arms, shoulders and back.

He's doing part of the work that used to be done by horses. No wonder he tires, loses efficiency, becomes less safe, sometimes destroys carefully built good will by snapping at passengers. It takes a lot of work to herd a heavy vehicle by main strength.

It is hardly progress to eliminate the horse and then have the operator do part of his work.

Vickers Hydraulic Power Steering doesn't give that work back to the horse—it gives it back to horsepower. It takes the work out of steering . . . requires no more effort than did a "flick of the reins." Wheeling is much less tiresome. So, naturally the driver can do his job better . . . with greater safety . . . with improved passenger relations.

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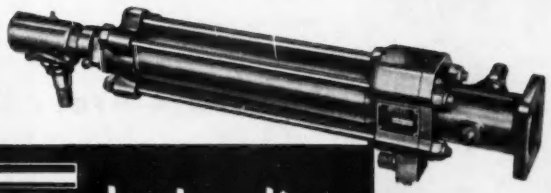

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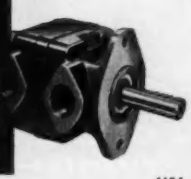

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Hydrapower Steering

(*Continued from page* 39)

or right by effort on the steering wheel, the stud of the lever is moved through the groove of the cam, thus rotating the levershaft and providing angular movement of the steering arm. However, when the effort on the steering wheel exceeds the pre-load of the cam centering springs, the hydraulic system comes into operation automatically. Hydraulic power is applied to the cross shaft through an extension of the lever, which contacts a sliding member connected to a power cylinder piston.

Mechanical torque capacity is always available in the event of a failure in the hydraulic system or in addition to torque applied by the hydraulic system. The gear has a ratio of 18 to one at the center and 23 to one at the ends.

The mechanism for hydraulic power transmission to the steering gear assembly consists of a hydraulic pump, a reservoir, a relief valve, a control valve and the power cylinder. Power to drive the oil pump is supplied by the vehicle's engine. Pump output at engine idle speed is 2.5 gpm. Capacity of the reservoir is two gal of SAE 10 engine oil. So that pump priming is not necessary, the reservoir is of course located above the level of the pump. The relief valve utilized in the system is usually set at a pressure of 750 psi, but if so required, it may be set up to 1000 psi.

With the valve set at 750 psi, levershaft torque is 25,400 lb-in. when using hydraulic power. At 1000 psi, the levershaft has a torque of 33,900 lb-in. Angular movement of the levershaft is 80 deg.

Since the control valve, used to direct the flow of oil to the power cylinder, is the heart of the power steering system, it is necessary to go into more detail concerning its operation. The control valve housing contains several internal channels through which the flow of oil is directed, Fig. 2. A sleeve fitted in the housing has accurately located openings corresponding to the oil channels in the housing. Likewise, the sleeve is fitted with a spool which has accurately located lands corresponding to the openings in the sleeve. When the valve is centered, each side of each land on the spool is spaced equidistant from a mating edge on the valve sleeve.

The spool is held in the center position by means of the cam centering springs. These springs are compressed to a predetermined load and installed as a self-contained assembly at each end of the cam. The preload is factory set and cannot be changed in service except with new units containing more or less springs. Effect of the springs is to center the cam and, in turn, the valve spool. When the steering force is great enough to overcome the spring

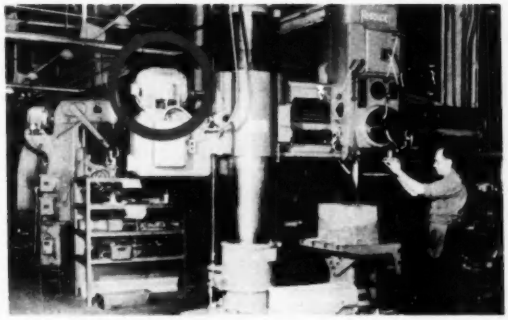
(*Turn to page* 67, *please*)

"We have three shifts in operation," says Julius J. Domonkos, Vice-President in Charge of Manufacturing, Bell Aircraft Corporation. "That's full production on a 24-hour day basis. For the past 10 years we've been depending on Tri-Clad motors to carry the load. We've never regretted putting our confidence in this fine motor!"

G-E Tri-Clad Motors drive the machines that are instrumental in producing helicopters, guided missiles, rocket motors, research aircraft, and jet aircraft engine nacelles for our rapidly expanding armed forces. At Bell Aircraft Corporation, G-E Tri-Clads are known as a thoroughly dependable motor —tough on the outside . . . on the inside . . . at the bearings.

BELL AIRCRAFT CORPORATION:

"We've been depending on Tri-Clad* Motors for Ten Years . . ."



This Tri-Clad driven radial drill takes care of most of the large dies for the entire Bell plant. Big dies and bolster plates are drilled and tapped on this machine, a critical part of the Bell operation. Despite continuous use, plant personnel can't remember a single interruption due to Tri-Clad failure!

*Reg. trademark of General Electric Co.

FASTEST BOMBER IN THE WORLD! Jet engine nacelles for the 600-plus miles-per-hour B-47 are being produced at a record-breaking clip in the Bell plant at Buffalo, N. Y. The "Stratojets" represent a major advance in bombardment aircraft.

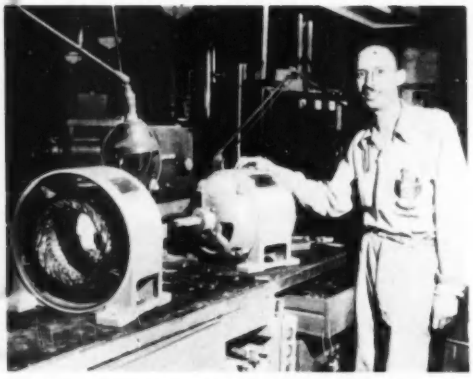
GENERAL ELECTRIC

TRI CLAD MOTORS

REG U.S. PAT. OFF.

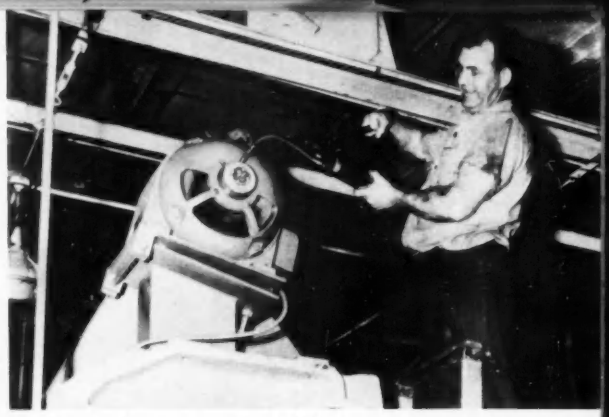
Help keep Bell Aircraft production up!

Marvin Limburg (left), Foreman of Bell's Tool and Die Shop, comments, "I don't believe we've ever lost machine time due to breakdown of Tri-Clad motors. And our jig-borers, for example *have been operating around the clock for the last 8 to 10 years!*"

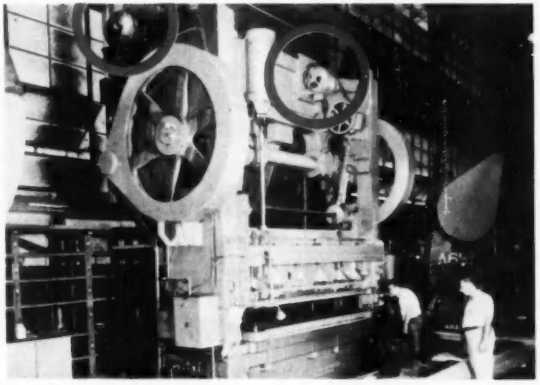


"It's the easiest motor we have to maintain" according to Maxwell Anderson, Crew Chief of Bell's motor repairmen. "There's more working room inside and more room in the slots. It's become a byword with us that if you give a Tri-Clad motor ordinary care you'll never have to worry about maintenance."

TIMELY READING—With every electric motor needed on the line, you'll want a copy of the G-E manual on "How to Maintain Motors and Generators." It's free; just ask for bulletin GET-1202. *Sect. 752-10, General Electric Company, Schenectady 5, N. Y.*



Greasing isn't necessary on a Tri-Clad motor in normal service, but it's always reassuring to know that you *can* lubricate if you so desire, without time-consuming disassembly. The photo shows how easy it is: remove relief plug, attach the grease gun nozzle, squirt—the job is finished.



This huge punch press is an important tool maker. Anton Geiser (right), assistant punch press foreman, says: "I can't recall a single shutdown of this section due to motor failure." Almost all motors in this department are Tri-Clad. This is another Bell Department which has been operating around the clock; cannot afford to lose time because of motor breakdown.

NEW! A Helpful Training Course on Motors!

Everyone concerned with technical training problems will want this new G-E Motor Selection and Application Course. Consists of 9 short, easily understood lessons. Complete kit—slide films, review booklets and instructor's manual—$100.00. Call or write your nearest G-E sales office.

Look at the Scope of this Course

1. Fundamentals of Motors
2. Types of Motors
3. Fundamentals of Selection
4. A-C Induction Motors
5. Single-phase Motors
6. D-C Motors
7. Synchronous Motors
8. Adjustable-speed Drives
9. Gear Motors

GENERAL ELECTRIC

Hydrapower Steering

(*Continued from page* 64)

load, the cam is displaced by a slight amount.

As the cam moves in either direction, it causes the valve lever to move and shift the valve spool, thus one of the control valve oil return passages to the outlet port is restricted, see Figs. 2B and 2C. This causes an immediate pressure increase in one side of the cylinder. At the same time, the opposite return passage has been enlarged, allowing the fluid, from the discharging side of the cylinder, free passage to the outlet port. The effect of the increased pressure in one side of the cylinder is a force acting on the piston and in turn on the inner lever of the gear. Full pressure is obtained with a cam travel of only a few thousandths of an inch. The slightest movement, therefore, results in a pressure differential.

Whenever the effort at the steering wheel is released, the cam and valve spool are returned to the center position.

If the steered wheels are subjected to a shock load, the Pitman arm, acting through the inner arm of the gear, shifts the cam and control valve in the appropriate direction. Fluid is then directed to the proper side of the piston to resist any movement due to the shock. This blocking action of the gear prevents kickbacks at the steering wheel.

Metal Sessions

(*Continued from page* 50)

and other components in alloy steel.

6. The need for more research on alloy steel behavior at extreme high and low temperatures—particularly for use in newly-developed jet and fission-propelled engines.

7. The high cost of new alloys and need for less expensive production methods for such newly developed metals as zirconium, titanium, vanadium, molybdenum and others still in developmental stages.

8. Finally, the need for greater knowledge concerning high frequency electric currents in processing metals.

In attendance are some 500 metal experts from 21 ECA and non-ECA countries. The Economic Cooperation Administration set aside over $500,000 to enable over 250 top metallurgists from Marshall Plan countries to attend the World Metallurgical Congress. Groups of them are inspecting the American metal industry in a series of top level "study tours" preceding and following the Congress, at the closing session of which they will be addressed by Defense Mobilizer Charles E. Wilson.

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MEETS GOVERNMENT SPECIFICATIONS

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MIL-S-5002	16E4 (Ships)
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AN-C-170 (See MIL-C-5541)	

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ALODIZING is an electroless protective surface conversion process for bonding paint to aluminum and protecting the metal.

Tough, durable ALODIZED surfaces are obtained easily and rapidly by immersion, brushing, or spraying in a multi-stage power washer.

ALODINE amorphous phosphate coatings provide extra paint permanence and extra durability for aluminum parts and products.

BRUSH "ALODINE" PROTECTS ALUMINUM
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Brush ALODINE is easily applied in a simple brush-on or flow coat process to large assemblies and surfaces—airplanes, trucks, trailers, boats, housing, building siding, railway cars, bridges, etc.—that are too bulky or too remote to be conveniently treated in tanks or a multi-stage power spray washer. The cleaning and coating chemicals for Brush ALODIZING are shipped in bulk or in the convenient Brush ALODINE Chemical Kit No. 1. This Kit contains enough chemicals to treat about 1,000 square feet of surface and is an ideal package for use at airfields of commercial airlines or of the Armed Services anywhere.

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AMERICAN CHEMICAL PAINT COMPANY

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Manufacturers of Metallurgical, Agricultural and Pharmaceutical Chemicals

For additional information regarding any of these items, please use coupon on page 60

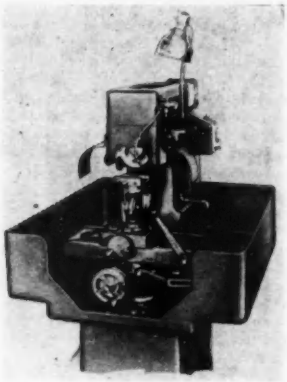
(*Continued from page* 54)

Booth F-211

MS-11—Finishing Grinder

Recently brought out by Hammond Machinery Builders, Inc., Kalamazoo, Mich., are two models of combination chip breaker and diamond finishing grinders—models CB-77 and CB-77W. These tools are said to provide rapid chip breaker grinding on one side and precise diamond wheel finishing on the other and handle all types of box and single point tools. They also can be used for grinding chip breaker grooves and for rough and finish grinding of solid carbide inserts when used with the Hammond carbide fixture.

Model CB-77 has a drip-feed tank with a wick and tube that supplies only enough coolant to prevent excessive loading of the wheels. Model CB-77W is designed for a constant flow of coolant. This model is equipped with wheel guards, no-splash pans, coolant spouts, shut-off valves, and a self-contained pump and tank unit that serves both the chip breaker and cup wheel sides.

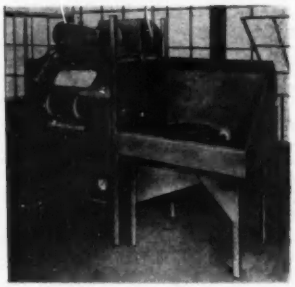


Hammond combination chip breaker and diamond finishing grinder, model CB-77W.

Booth F-439

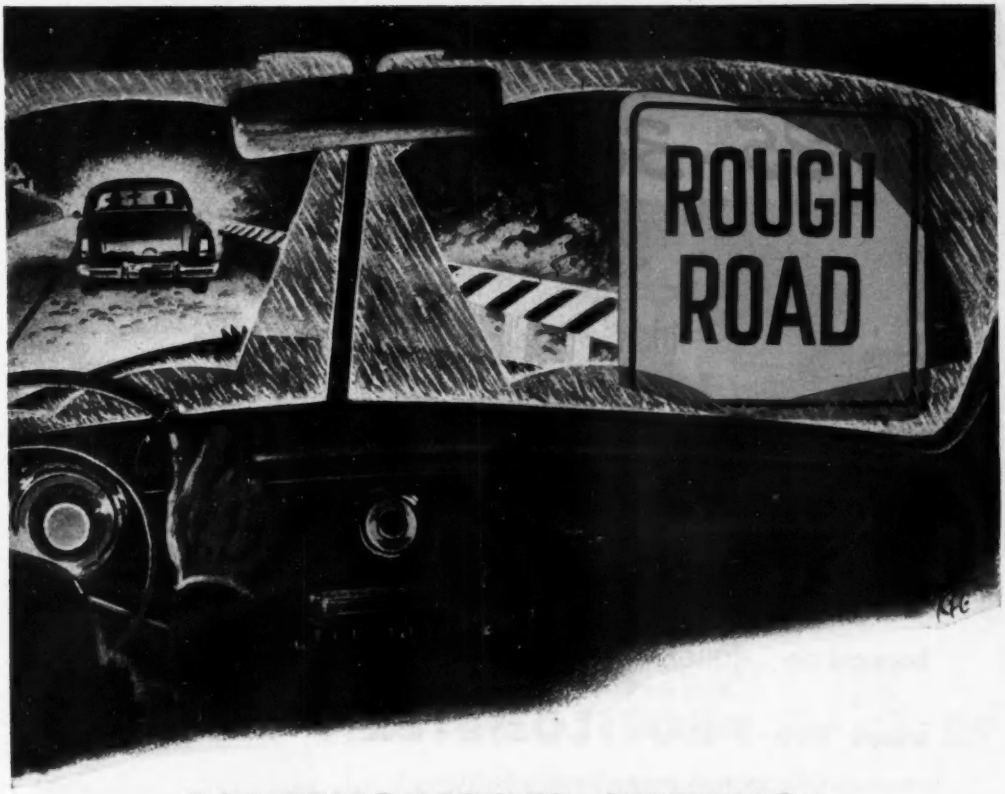
MS-12—Wet Blast Machine

Introduction of a wet blast machine with many special features for improved operation and reduced maintenance has been announced by American Wheelabrator & Equipment Corp., Mishawaka, Ind.



American Wheelabrator wet blast machine

(*Turn to page* 70, *please*)



FOR "ENGINEERED STEERING"

You can count on Thompson

Engineered steering is a specialty at Thompson Products' Detroit Plant.

For 35 years Thompson's engineers have worked closely with car, truck and tractor builders. *Together,* they have helped develop steering safety.

Today, Thompson's Detroit Plant makes more steering linkage than anyone else in the world.

All Thompson's research, experience and manufacturing facilities are available to *all* car builders. When you need steering linkage, you can count on Thompson Products.

In developing new steering linkage . . . for dependable steering—call on Thompson Products, Inc., 7881 Conant Avenue, Detroit, Michigan. Phone: WA 1-5010.

Thompson Products, Inc.

DETROIT DIVISION

Cylinder Life Increased 25-30%

because OILGEAR uses the PROFILOMETER

In the production of hydraulic pump cylinders at the Oilgear Company, Milwaukee, Wisconsin, the Profilometer is used in two ways. First, it is used when all pilot models of cylinders are being constructed to help determine the optimum surface finish required for maximum life and efficiency of the part. Then, as a production tool, the Profilometer insures that each part will conform to the specifications that are set up. Oilgear engineers estimate that use of the Profilometer in this manner, as compared to previous methods of surface inspection, *has increased the life of the cylinders 25-30%.*

In its use as a shop tool at Oilgear, the Profilometer has a continuous function in the production of the cylinders. It checks both the finish grind and the final lapping operation which must produce a rating of 50 microinches or less. In addition, pistons for all cylinders are held to about a 6 microinch finish, and these, too, are checked in production with the Profilometer

Fast, accurate surface measurement is important to Oilgear's operations. The Profilometer gives it to them.

To learn how the Profilometer can help cut costs in your production, write today for these free bulletins.

Profilometer is a registered trade name.

PRC PHYSICISTS RESEARCH COMPANY
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What's NEW at the METAL SHOW

For additional information please use coupon on page 60

(*Continued from page* 68)

Among the special features in the Liquamatte wet blaster is a vertical pump for slurry recirculation. It is primed by flooded-type suction. Another important feature is that the hopper need not be drained before the pump is removed.

The machine has a conveniently low work ceiling, but the bottom of the machine is high enough off the floor to make good housekeeping possible. Rubber hose has been used wherever possible. Gauntlet drainage has been designed so that there will be no slurry dripping down the front of the cabinet. The machine is intended to perform work for which dry blasting is too severe; namely, work with thin edges and sharp corners or work needing precision cleaning.

Booth B-118

MS-13—Absorption Beta Gage

Tracerlab, Inc., Boston, Mass., will demonstrate its newest style absorption Beta gage, model BE-1. These gages are used for the control of thin metal sheets and metal foil as well as various other uses.

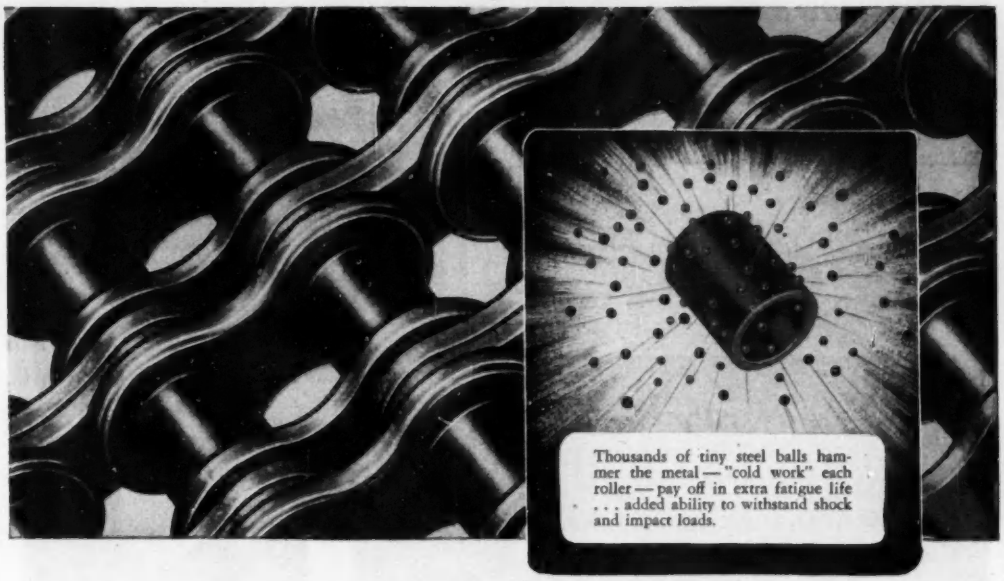
Booth C-122

MS-14—Die Steel for Forging Presses

Prestem, a hot working die steel for forging presses and upsetters, will feature the exhibit of Heppenstall Co., Pittsburgh, Pa. This material, available in two hardness ranges—41 to 45 Rc and 36 to 40 Rc, is said to be readily machinable. Other features are that the material resists scaling and decarburization, heat checking or thermal cracks on surface, plastic flow or distortion, hot erosion and wear, and development of fatigue cracks at sharp fillets.

When preheated to 300 to 500 F, it is said to possess high impact resistance. It can be tempered at temperatures

(*Turn to page* 72, *please*)


Thousands of tiny steel balls hammer the metal — "cold work" each roller — pay off in extra fatigue life . . . added ability to withstand shock and impact loads.

Why you should be sure the roller chain you buy has

SHOT-PEENED ROLLERS

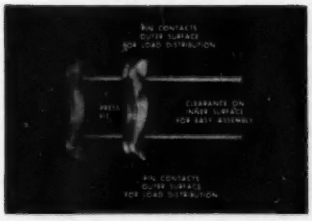
. . . one of the extra-strength features you get with every LINK-BELT Roller Chain

Look for the distinguishing darkened rollers on every roller chain you buy! They're your guarantee of extra fatigue life.

Shot-peening is just one of the added manufacturing refinements that make Link-Belt Precision Steel Roller Chain a longer-life chain. Controlled material selection and heat treating assure absolute uniformity . . . no weak members.

Link-Belt Roller Chain is available in single or multiple widths, in ⅜ to 3 in. single and double pitch. For the best in roller chain, get in touch with your nearest Link-Belt office.

Easier coupling and uncoupling without sacrificing load distribution



Patented E-Z Assembly feature of Link-Belt Precision Steel Roller Chain has won world-wide approval. Coupling and uncoupling of multiple width chains—right on the job—is far easier. There's absolutely no sacrifice of load distribution . . . no loss of the chain's remarkable performance. Press-fits between chain pins and middle bars have been modified. But full load-carrying capacity across the entire width of the chain has been maintained.

LINK-BELT

PRECISION STEEL ROLLER CHAIN

LINK-BELT COMPANY: Indianapolis 6, Chicago 9, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in principal cities. 12.200

— What's NEW at the —

METAL SHOW

For additional information please use coupon on page 60

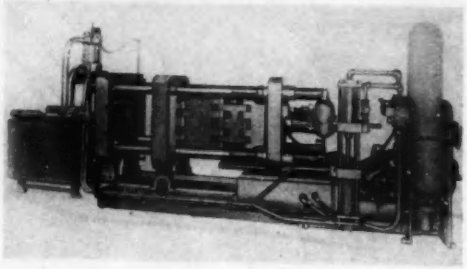
(*Continued from page 70*)

ranging between 850 and 1050 F. During forging operations, the dies can be water cooled.

MS-15—Die Casting Machine.

Booth G-456

This "Cast-Master," die casting machine made by the Miller-Taylor Tool Co., Cleveland, Ohio, will be exhibited. It features a new hydraulic system that is said to minimize fire hazards. Other features include all-steel construction, and ease of operation and maintenance.



Highest Precision

HARDENED & GROUND PARTS

THE ball stud shown here is a perfect example of the precision methods and quality material that go into the production of all Brown Hardened and Ground Parts. Twelve separate operations are employed to produce this vital part. Every feature about this ball stud *has* to be right—every feature *is*. It has strength, wear resistance, precision fit, true-ground spherical and tapered surfaces, close inspection and strict uniformity.

Brown Hardened and Ground Parts have been serving the automotive industry for over 40 years. We refer you to any of our long list of satisfied customers. For information pertaining to your own requirements, simply write or wire.

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Parts Include . . .
King Pins
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Shackle Pins
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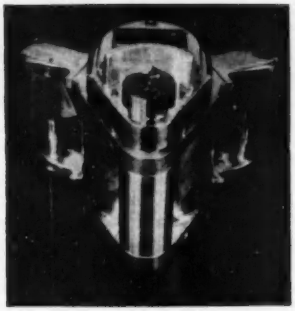
Idler Shafts
Stub Axle Shafts
Steering Ball Bolts
Beam Bolts and Bolts
5th-Wheel Rocker Shafts
Wheel Studs
Water Pump Shafts
. . . anything in the hardened and ground line, of any analysis steel, up to 4¼" diameter.

THE BROWN CORP.

213 BELLEVUE AVE. SYRACUSE, N.Y.

Booth D-112

MS-16—Contour Cutting Hand Tool



On display by the Composite Die Supply Co., Detroit, Mich., will be a portable electric contour cutting hand tool — the Handshaper. This tool can be used for cutting and shaping wood, plastic, non-ferrous metals and alloys, etc. It has one cutting head with two high speed adjustable cutting blades. A one-hp, 115 v, 60 cycle a-c and d-c, 18 000 rpm motor is used to drive the tool.

Booth D-129

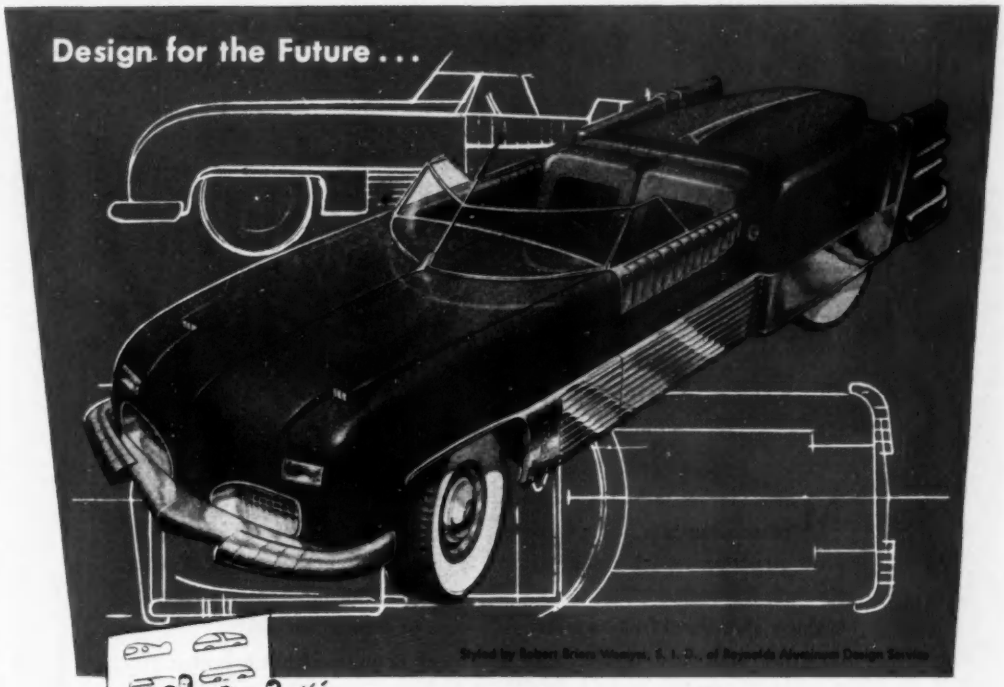
MS-17—Silver Clad Steel

A laminated strip product consisting of a solid sheet of silver, clad on either one or both sides of a core of mild steel, has been developed by the Rolled Plate Div., American Silver Co., Inc., Flushing, N. Y.

This silver-clad steel strip is available in widths up to four in. in thicknesses down to 0.005 in., and in any required temper. It is being manufactured in various silver-to-steel thickness ratios and rolled and slit to commercial or precision tolerances. The strip is produced with a high, as-rolled lustre, and can, if desired, be electroplated directly with non-restricted metals.

Silver-clad steel may be used as a substitute for brass, nickel-silver,

(*Turn to page 76, please*)



To the Executive Planning for TOMORROW...

There's a lot of aluminum in the forecast designs for the 1960's. Even the more powerful engines are of aluminum . . . making these prototypes virtually all aluminum. And just as *today's* models include the features from forecast designs of a decade ago, items from present advance models will be used in *tomorrow's* production.

Why not take advantage of the benefits of aluminum in your future designs? Put aluminum on your drawing boards now. Supplies of bauxite ore are ample for generations and this, together with expanding aluminum production facilities assures a steadily mounting supply of *tomorrow's main metal* . . . at a consistently low price.

Reynolds Aluminum Specialists are now working with many companies on their future designs. They will be glad to work with your designers to assure you of the maximum benefits of aluminum—low cost, lightweight with strength, natural attractiveness, wide range of finishes, freedom from destructive rust, ease of fabrication.

Today, call the Reynolds office listed under "Aluminum" in your classified telephone directory. Or, write to Reynolds Metals Company, 2587 South Third Street, Louisville 1, Kentucky.

and to the Man in Charge of TODAY'S PRODUCTION!

Do you have a defense contract that specifies aluminum? To eliminate production problems, acquaint yourself with the accepted production techniques for fabricating aluminum. Write for complete list of Reynolds technical books covering every phase of fabrication. And for *special* problems, take advantage of Reynolds trained staff of aluminum specialists.

REYNOLDS METALS

REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND

Friction material problem?

R/M BELONGS IN YOUR PICTURE!

"STOP-AND-GO" IS OUR BUSINESS!

MAYBE YOU'RE not in the road machinery business . . . but *whatever* your problems with brakes and clutches, RAYBESTOS-MANHATTAN can engineer specialized friction materials with the same fine results enjoyed for years by leading makers of tractors, bulldozers, graders and shovels.

Equally impressive is the R/M leadership in the automotive industry. More cars, trucks and buses use R/M brake linings, clutch facings, and automatic transmission friction material parts than any other make. This R/M leadership extends to scores of other industries, ranging from office equipment to mining machinery.

You're on the right track when you call in the R/M man. He's ready to help you . . . and he can work from samples, from designs on paper, or from figures on horsepower development combined with desired performance characteristics.

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RAYBESTOS-MANHATTAN, INC.

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Factories: **Bridgeport, Conn. Manheim, Pa. Passaic, N.J. No. Charleston, S.C.**

Canadian Raybestos Co. Ltd., Peterboro, Ont.

RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings Fan Belts • Radiator Hose • Mechanical Rubber Products • Rubber Covered Equipment • Packings Asbestos Textiles • Powdered Metal Products • Abrasive and Diamond Wheels • Bowling Balls

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A "stock quotation" that pays big dividends

SIMONDS ABRASIVE CO.

Grinding Wheels

All the boys ask for Simonds wheels," says the storekeeper. Why? Because they can count on top production and fewer rejects with Simonds Abrasive Company wheels. They're proven producers—accurately specified for every job . . . a real investment in greater grinding efficiency for you. Free data book describes Simonds complete line of grinding wheels, mounted wheels and points, segments and abrasive grain. Write for it . . . and the name of the Simonds distributor ready to serve you.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

What's NEW at the METAL SHOW

For additional information please use coupon on page 60

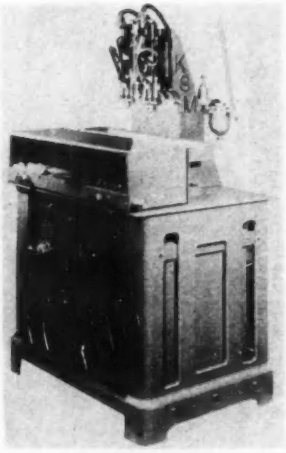
(*Continued from page 72*)

nickel, and other restricted metals, subject to NPA order M-47. It can be shaped by stamping, bending, drawing, spinning, and other conventional metalworking processes, and component parts can be assembled by means of silver brazing or soft soldering.

Booth G-321

MS-18—Stud Welder

A high-speed dual head stud production unit has been developed by KSM Products, Inc., Merchantville, N. J., for military and civilian application. Unit combines precise fast operation and



KSM stud welder.

heavy-duty construction features. In operation, accurate placing of work in V holder is assured by built-in microswitch which prevents operation if work is not correctly located.

Special features of the production unit include: automatic clamping device to prevent movement of work; leader pin guides to insure accurate positioning of the work in relation to welding heads; and automatic spark shield which raises up in front of welding heads prior to welding to protect operator from possible flash or splatter. Capacity of the unit is eight welds per min.

(*Turn to page 78, please*)

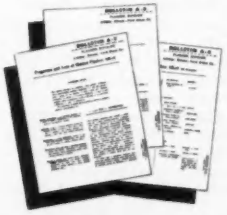
Lift a money-saving Idea from Mr. Mallory's best coil...

You can make your electrical parts better, faster, often at lower cost

The coil top of this Mallory Electric Corporation ignition coil is molded from Plaskon Alkyd, the thermosetting molding compound with special superior electrical properties. This Plaskon Alkyd coil top, along with other top-quality materials, lets Mr. Mallory confidently label this "the best coil I ever made"... and sign it!

Other superior properties of Plaskon Alkyd include high resistance to "tracking" and arc-injury, low moisture absorption, resistance to organic solvents and detergents, and dimensional stability even at elevated temperatures and humidity.

Plaskon Alkyd molding compounds have saved up to 50% in parts cost... quick curing properties permit faster molding cycles, fewer mold cavities and lower molding pressures. Plaskon Alkyd is readily molded in fully automatic or modified conventional molding equipment.



We will gladly send you literature and tell you more about Plaskon Alkyd molding compounds

mold it better and faster with

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2139 Sylvan Avenue, Toledo 6, Ohio
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Manufacturers of Molding Compounds, Resin Glues, Coating Resins

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ALKYD

For additional information regarding any of these items, please use coupon on page 60

(*Continued from page 76*)

Booth F-302

MS-19—Dies and Punches

Two products are being introduced by Allied Products Corp., Richard Brothers Div., Detroit, Mich.

A die design for inserting clinch nuts in sheet metal will be on display. With this design, clinch nuts can be inserted and clinched singly or multiply with each stroke of the press. Conventional die construction is used, with the exception of a hopper and chute which feed nuts into the punch section. The same die can also be used to pierce, blank or form the part to which the nuts are being fastened.

Also to be displayed is a line of extra heavy duty interchangeable punches for extra heavy piercing applications. These punches and their retainers feature a heavier ball retaining lock than the company's standard line of interchangeable punches and dies.

AFTER exhaustive and revealing tests have demonstrated the superiority of VULCAN special-purpose diaphragm materials, many of the leading automotive part manufacturers are now switching to VULCAN diaphragms. Wherever diaphragms are used—as in fuel pumps, vacuum booster pumps, dashpot mechanisms and others, these materials excel in performance. They are highly resistant to gasoline, aromatics, oils, alcohols, butane, propane and solvents. They also provide high tensile and burst strength. They insure long life in continuous service. Investigate these new, improved diaphragms. It will pay!

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PRODUCTS, INCORPORATED

FIRST AVENUE AND 58th STREET, BROOKLYN 20, N. Y.

Pacific Coast Representative: GORDON Z. GREENE CO., 2335 E. 8th St., Los Angeles 21, Calif.

Booth B-223

MS-20—Electric Etcher

Engis electric etcher, the Taylor-Hobson "Javelin".

Tools, gages, parts for automobiles, aircraft, engines, and machinery can be marked with the Taylor-Hobson Javelin etcher, distributed exclusively by Engis Equipment Co., Chicago, Ill.

This machine handles up to 15 workpieces at one time; etching on hard or soft metals—flat or curved surfaces—with identifying numbers, names, trademarks or designs.

The marking is produced by means of a series of minute electric arcs, formed at the point of a rapidly vibrating electrode linked to a pantagraph. The pantagraph is guided in specially prepared intaglio copy.

The Javelin method offers maximum flexibility for shape and size of workpiece—for design and depth of mark. A piece may be etched in its finished state without prior or after-treatment.

Booth A-360

MS-21—Electronic Drive

The electronic Reliance V*S Drive will be featured by Reliance Electric

(*Turn to page 82, please*)

NEW AIR FORCE REFUELING TRAILER Manufactured by the Heil Company of Milwaukee, Wisconsin. Has 5000 gal. capacity, can deliver 600 gal. of fuel per minute. For fast, sure starting it has a South Wind "978" that preheats the engine in its pumping compartment—*from the inside*. Hose reel compartment, too, is South Wind "winterized."

NEW REO "EAGER BEAVER" Army's newest six-by-six . . . 2½ ton heavy duty utility vehicle and cargo carrier. Can travel up 60° grades or under water. A South Wind "978" defrosts windshield, keeps cab and personnel warm.

NEW "ACK-ACK" GUN CARRIAGE Mounts twin 40 mm. anti-aircraft guns. Equipped with two South Wind "978's." One for personnel heating inside, and one in the gun turret to heat the turret components.

NEW "FROST-FIGHTER" FOR MILITARY VEHICLES

Keeps Personnel Warm . . . Equipment Functioning Under Severest Weather Conditions

Adding strength and mobility to U.S. armed might—a vast new array of versatile, efficient military vehicles! And now, for improved starting power, top performance under severest weather conditions, they're carrying South Wind's famous "978" military heater as standard equipment.

Simplified in design. Compact. This rugged forced air heater preheats, heats and defrosts in any type of military vehicle—in temperatures as low as 70° below zero. Dependably safe because the combustion air system is completely separated from the ventilating air stream. Always fast acting because warm air circulation doesn't depend on engine heat.

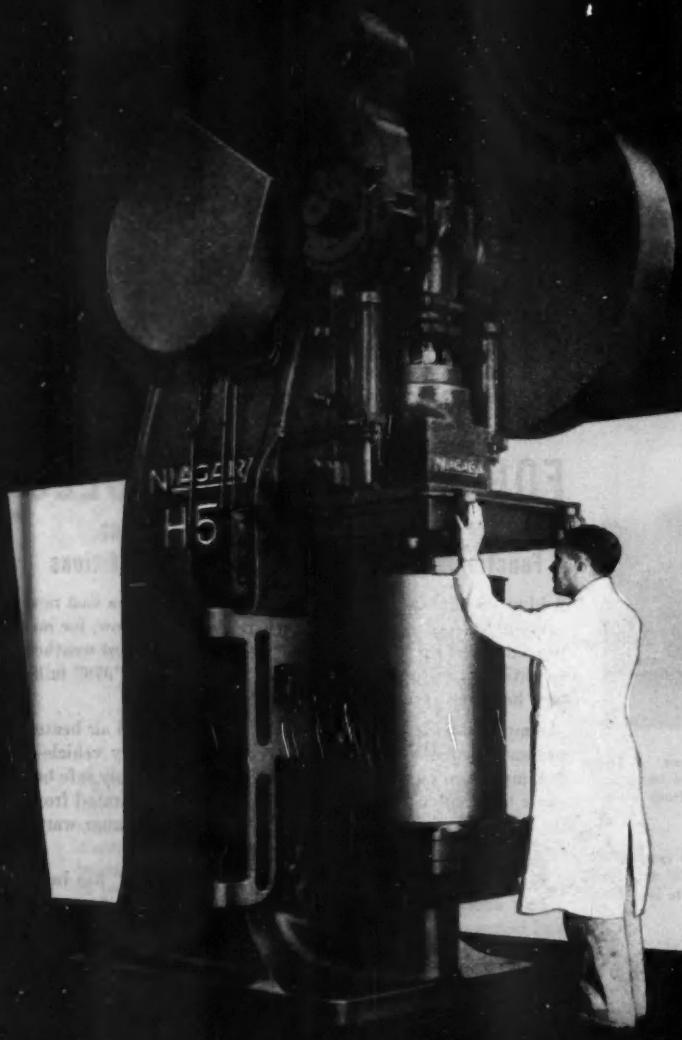
Built to Army Ordnance specifications, the "978" has been widely accepted by the Army for its winterization program. And because of its many exclusive advantages, promises to be influential in guiding future designs for commercial car heating, too.

WRITE NOW for free information and complete details. See how easily this practical heating system can be worked into your own Ordnance program. Address inquiries to Stewart-Warner Corp., South Wind Division, 1514 Drover Street, Indianapolis, Indiana.

STEWART-WARNER

PERSONNEL HEATING *South Wind*
ENGINE AND EQUIPMENT PRE-HEATING
WINDSHIELD DEFROSTING

NIAGARA



Niagara H-5 Geared Horn Press with air sleeve clutch and air releasing brake. Arranged with special table and dies for curling and flanging the ends of a 55 gallon 18-gage steel drum body.

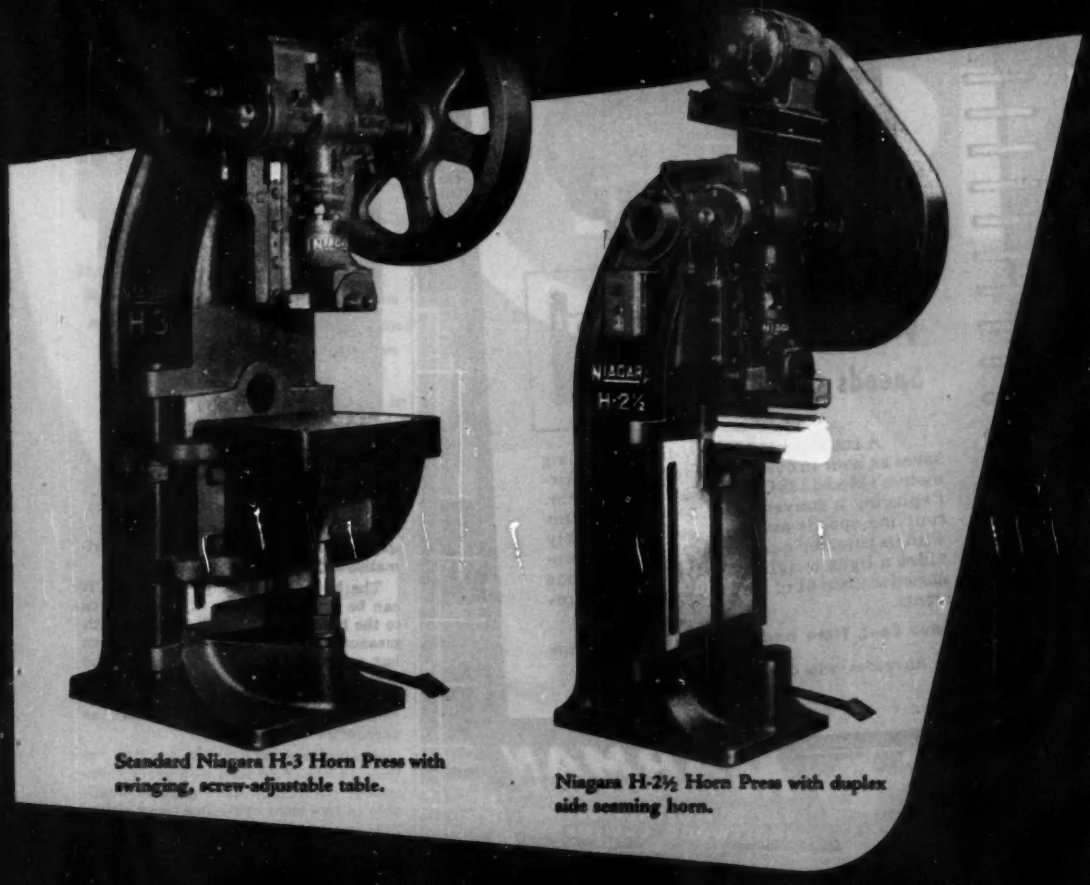
✳ **In addition to ordinary blanking and forming work, these presses can be used for a variety of other operations requiring exceptional die height, such as curling, wiring and flanging container bodies. When fitted with a horn they can perform seaming, piercing, riveting and forming operations on the sides of formed shells.**

***Write* for specifications on sizes to fit your requirements.**

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

ADJUSTABLE BED HORN PRESSES

offer Versatility for Defense Production



Standard Niagara H-3 Horn Press with swinging, screw-adjustable table.

Niagara H-2½ Horn Press with duplex side seaming horn.

America's Most Complete Line of Presses, Shears, Machines and Tools for Sheet Metal Work

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ENGINEER'S NOTEBOOK

V-Band Coupling Speeds Overhaul

A standard Marman V-Band Coupling saves an hour in overhaul time on Pacific Airmotive's Model 138 Cabin Pressure Regulator. Replacing a conventional bolted joint, this coupling speeds assembly and disassembly with its patented quick coupler latch and provides a light weight positive seal that has passed method 61 of A.A.F. vibration requirements.

Save Cost, Time and Weight with Marman

For information, write Dept. A-10

MARMAN PRODUCTS CO. INC.
940 W. FLORENCE AVENUE
INGLEWOOD, CALIFORNIA

Standard Clamps for Special Applications

What's NEW at the METAL SHOW

For additional information please use coupon on page 60

(*Continued from page* 78)

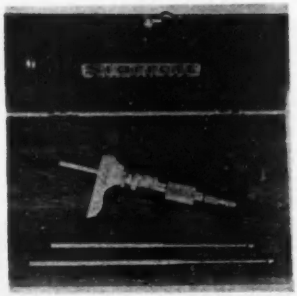
and Engineering Co., Cleveland, Ohio.

The electronic unit is the most recent development of Reliance V*S Drive—the all-electric adjustable-speed drive for a-c circuits. It is supplied in sizes from ¾ to three hp. Fast, smooth starting and stopping, controlled acceleraiton and deceleration, wide speed ranges, quick reversing, and jogging, inching and creeping are its features.

Booth C-123

MS-22—Micrometer Depth Gages

The L. S. Starrett Co., Athol, Mass., will exhibit recently developed micrometer depth gages, the No. 449. These



Starrett micrometer depth gages, No. 449.

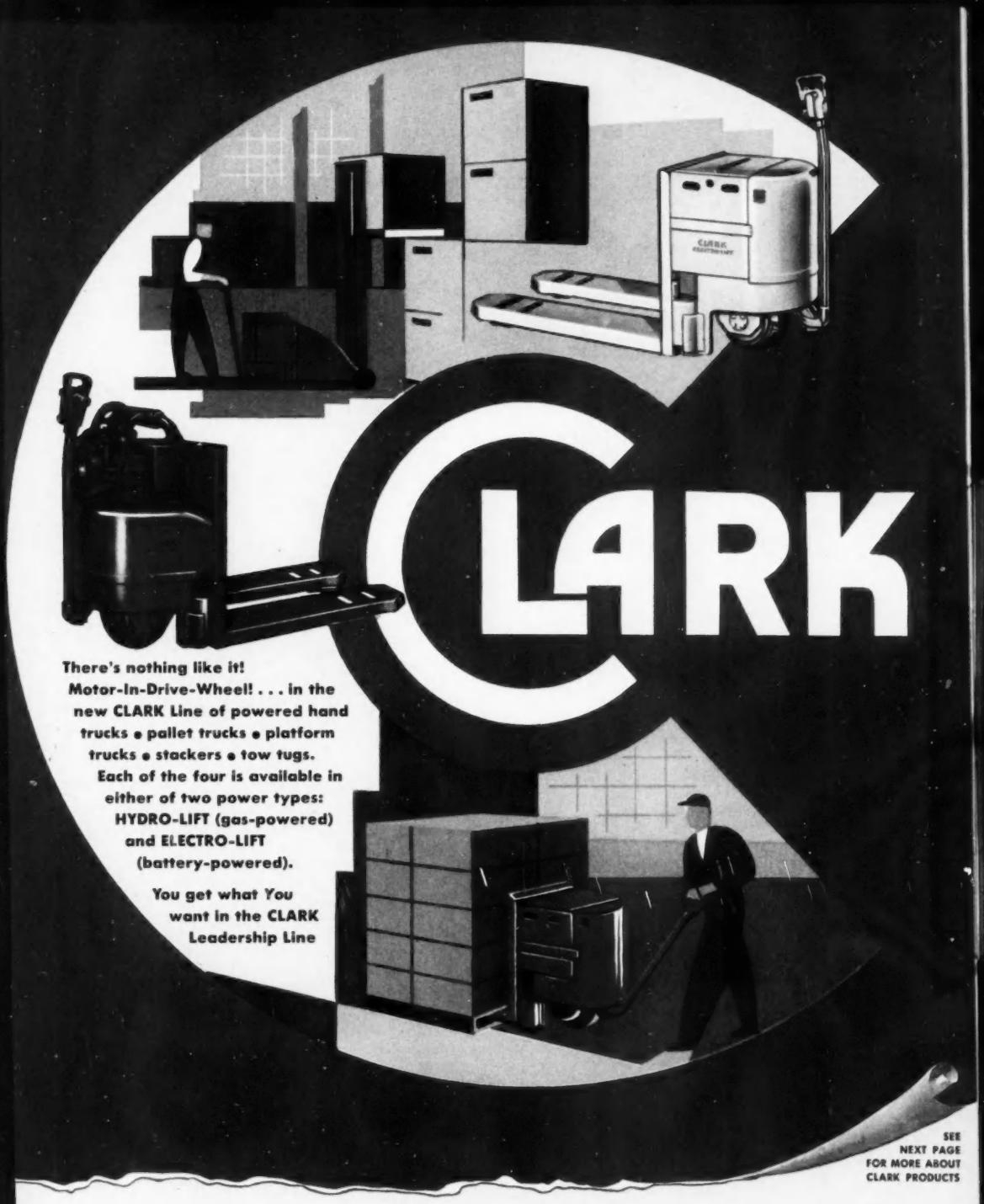
gages have blade-type rods approximately 0.045-in. thick by ⅛-in. wide.

The blade turns under friction so it can be positioned at any angle relative to the base, and in actual use for depth measurements, the blade does not turn but moves perpendicularly only. This feature permits measuring the depth of narrow shoulders without the blade rolling off, also slots and recesses as narrow as 0.045 in.

Graduations are quick reading in thousandths of an inch with every thousandth numbered. This gage is available in two sizes providing bases either 2½ in. or four-in. long. Bases are hardened, ground and lapped. The screw is accurately ground and gives one in. movement.

Both sizes can be furnished for measuring from zero to three in. by means of three rods or zero to six in. by six rods. The rods, which have individual

(*Turn to page* 85, *please*)



There's nothing like it! Motor-In-Drive-Wheel! . . . in the new CLARK Line of powered hand trucks • pallet trucks • platform trucks • stackers • tow tugs. Each of the four is available in either of two power types: HYDRO-LIFT (gas-powered) and ELECTRO-LIFT (battery-powered).

You get what You want in the CLARK Leadership Line

SEE NEXT PAGE FOR MORE ABOUT CLARK PRODUCTS

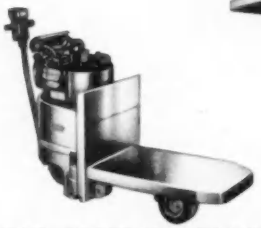
CLARK EQUIPMENT COMPANY, Buchanan, Michigan

Other Plants: BATTLE CREEK AND JACKSON, MICHIGAN

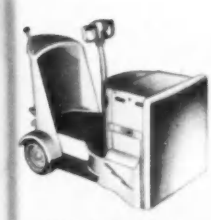
AGAIN! in Powered HAND TRUCKS

CLARK GIVES YOU WHAT YOU WANT

See how this remarkable line, with its vital exclusive features, solves many materials-handling problems. Into these powerful, adaptable machines are built all the advantages which have established CLARK fork-lift trucks and industrial towing tractors as The Leadership Line in Modern Materials Handling Equipment.



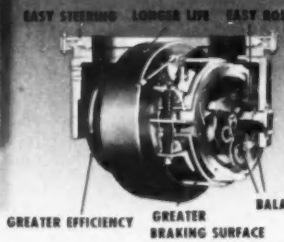
HAND PLATFORM TRUCKS
- HYDRO-LIFT and ELECTRO-LIFT
- . . . capacity 6000 pounds



TOW TUGS
- HYDRO-LIFT and ELECTRO-LIFT
- . . . 700 pounds draw-bar pull

HAND PALLET TRUCKS
- HYDRO-LIFT and ELECTRO-LIFT
- . . . 6000 pound capacity

HAND STACKERS
- HYDRO-LIFT and ELECTRO-LIFT
- . . . capacities 1500 to 3000 pounds



EXCLUSIVE IN CLARK POWERED HAND TRUCKS- the MOTOR in the DRIVE WHEEL

This phantom view of the drive wheel shows clearly several points of superiority of Clark's revolutionary motor-in-the-drive wheel design. Pictured here is the Electro-Lift showing the mounting of the electric drive motor. The gas-powered Hydro-Lift design is exactly the same—with the vane-type hydraulic motor in the wheel. This unique and practical design produces these advantages:

- More load on wheels, less on the rollers
- Increased underclearance
- Larger battery compartment (in Electro-Lift)—accommodates batteries up to and including 19-plate
- A shorter truck—in the Electro-Lift, battery is carried above wheel
- Lift cylinder closer to the load
- Drive unit completely enclosed

For full information about Clark's Powered Hand Trucks and the full Leadership Line, see your Clark dealer—listed in the Yellow Pages of Your Phone Directory; and send the coupon for helpful literature.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS
AND POWERED HAND TRUCKS • INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 35, MICH.

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POWERED HAND TRUCKS • GEARS & FORGINGS • RAILWAY CAR TRUCKS
AXLE HOUSINGS • ELECTRIC STEEL CASTINGS • AXLES • TRACTOR UNITS

For additional information regarding any of these items, please use coupon on page 60

(*Continued from page* 82)

length adjustment, are inserted through a hole in the screw and brought to a positive seat by a knurled nut. Ends of rods are hardened, ground and lapped.

Booth G-451

MS-23—Copying Machine

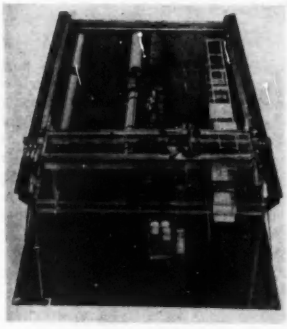
A desk-model copying machine is announced by Ozalid, Div. General Aniline and Film Corp., Johnson City, N. Y. The machine has a capacity of up to 1000 copies per hr of different originals. Copies can be up to 16-in. wide, any length.

Called the Ozamatic, it features a stabilized lamp requiring a very little warm-up period, a newly designed developer system, air cooling, and vapor expulsion.

Booth H-215

MS-24—System for Materials Storage

Chicago Tramrail Corp., Chicago, Ill., will have on display in their booth a working model of their Stak-Rak method of selective storage. Stak-Rak is said to provide 100 per cent selectivity of any item of any size or shape,



Chicago selective storage system. the Stak-Rak.

and is adaptable to such diversified objects as rough stock, pallets, rolled goods, drums, bundles, dies, patterns and tote boxes.

Essentially the Stak-Rak system consists of self-standing rack-columns, designed to receive the required material, arranged on either side of narrow aisles. A crane bridge spans the entire width of the storage area and travels lengthwise on tracks to any depth. The bridge is equipped with an overhead trolley from which is suspended an electric fork lift. The fork lift revolves to serve either side of the aisles, and one operator can control the motions required to place or remove any item from its place.

Booth H-316

MS-25—Saw

A one-piece heat treated, alloy steel piston with separate clamping jaw, hardened "Gleason Cut" drive gears, in-

(*Turn to page* 86, *please*)

CONTROL POWER BETTER

Get the RIGHT Clutch for YOUR Need
There is no one stock answer to every power transmission control problem. That is why ROCKFORD clutch engineers can be of practical help in designing an application that will increase your product's efficiency—make a substantial saving in cost and reduce servicing down-time. Send a print or description of your need for their recommendations, based on the extensive ROCKFORD line of clutches, power take-offs and speed reducers.
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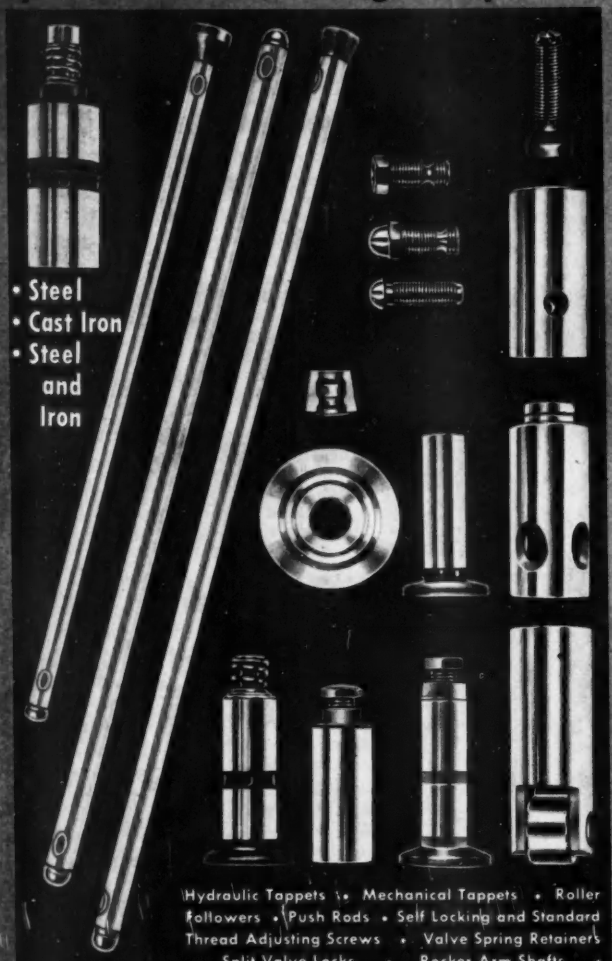
ROCKFORD CLUTCHES

"CHICAGO"
precision valve gear parts



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Flywheel to Crankshaft Screws.....Diesel Energy Cells
Wheel Bolts and Studs.....Differential Carrier Screws
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Automatic Transmission Valves.....Water Pump Shafts

Special Screw Machine Parts ⅛" to 5" Diameter • Cap Screws • Set Screws • Nuts • Studs • Taper Pins • Socket Screw Products

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2801 WASHINGTON BLVD.
BELLWOOD, ILL.
Established 1872

What's NEW at the METAL SHOW

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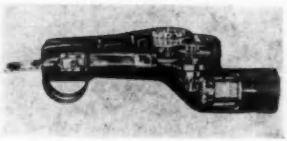
(*Continued from page* 85)

sert type piston bearings, a one-piece connecting rod with 30 per cent more bearing area and other design changes have considerably improved the performance of the new model T Super



R.C.S. Super Saw, model T.

Saw, put out by R.C.S. Tool Sales Corp., Joliet, Ill. The entire unit is now completely sealed against grease leakage, and a new grip, as well as the re-designed shank of the new "Vise-Lok" Super-Saw blades still further prevent slippage or possibility of chatter.

The same built-in blower which keeps the entire mechanism cool also blows chips or saw dust away from the cutting line. Power is provided by any heavy-duty ¼ in. or 5/16 in. electric drill, by air drill or by standard flexible shaft equipment. And, although the Super Saw measures only 10¾ in. overall, it is designed as a heavy or constant duty power tool.

Booth B-147

MS-26—Surface Comparator

Faxfilm surface comparator—a non-destructive method for the comparison of surface conditions of a wide variety of materials—has been placed on the market by the Brush Development Co., Cleveland, Ohio. It can be used to evaluate roughness of finish and results of wear tests and to establish machining characteristics of materials. Both irregular and curved shapes can be checked to show lay, tear, porosity or chatter.

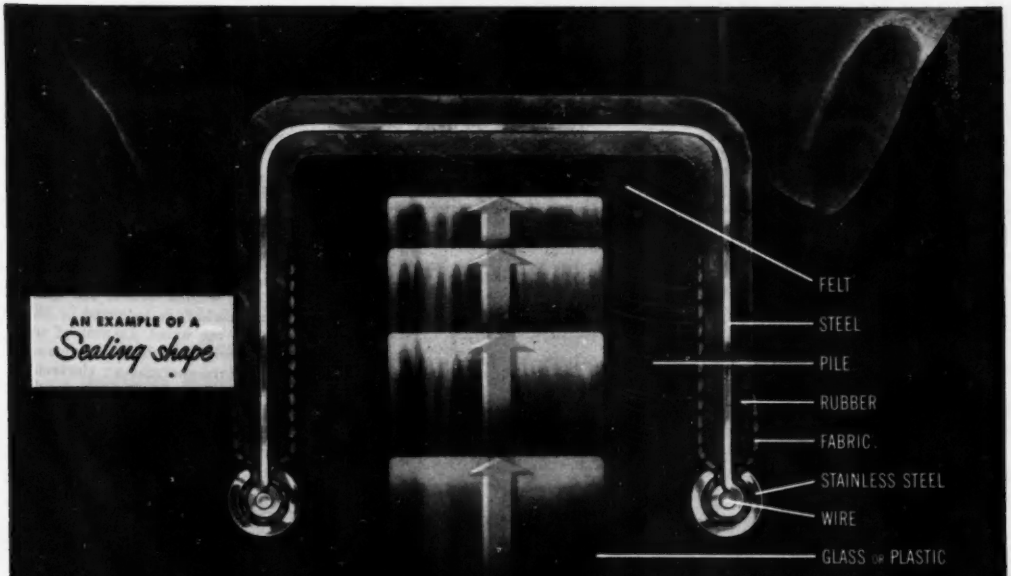
Booth C-111

MS-27—Woven Wire Sling

Announced by the Cambridge Wire Cloth Co., Cambridge, Md., is the gripper woven wire sling.

The gripper sling is a materials han-

(*Turn to page* 88, *please*)



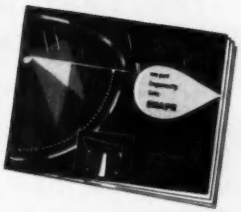
if it needs a special shape to seal, guide or protect, we can design it...mass produce it...economically

Above you see an enlarged cross section of automotive window channel. We show it this way to illustrate the variety of materials and bonding processes required to produce this particular "sealing shape."

This is only one of many ingenious "shapes" we produce to do a variety of jobs . . . to seal against moisture, heat, cold, dust or air leakage . . . to provide a guide for sliding or rotating motion . . . to cushion against shock or sound.

As the world's largest producer of automotive window channel and weatherstrip, we have developed a number of special techniques for forming metal, rubber or fabrics —and bonding them together permanently. We stamp metals to unusually close tolerances, mold or extrude plastics in almost any shape desired.

If this specialty of ours suggests an idea for improving your product or reducing its cost, we'd like an opportunity to discuss it with you. Or write for a copy of our new booklet, "We Put Ingenuity into SHAPE".



THE MARK OF A SUPERIOR PRODUCT

The Standard Products Co.

DEPT. G. GENERAL OFFICES: 2130 WEST 110 STREET • CLEVELAND 2, OHIO

WE PUT INGENUITY INTO SHAPE

For additional information regarding any of these items, please use coupon on page 60

(*Continued from page 86*)

dling tool which consists of a series of spiral wires joined together across the body of the sling in the same manner as a woven wire conveyor belt. Special heat treated steel handles are welded to each end of the sling and these are designed so that one set of handles can be used for either a basket or choke hitch. The bearing surface of the sling is broad and flat and bends across its width, rather than along its length.

Booth D-216

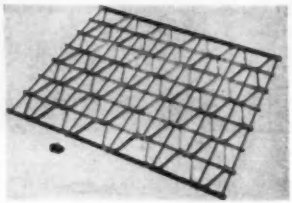
MS-28—Crankshaft Balancing Machine

A completely automatic crankshaft balancing machine, the ElecTOdyne, will be shown by Tinius Olsen Testing Machine Co., Willow Grove, Pa. Each end of a crankshaft is balanced by this machine and the exact amount of unbalance is designated on an indicator. These indicators energize an electronic brain which in turn controls hydraulic drills. The machine is entirely controlled by time delay relays.

To correct an unbalance condition, the drills are used to take off the exact amount of metal from the crankshaft. The crankshaft is then checked for final unbalance.

Booth D-146

MS-29—Alloy Grid



An alloy grid that successfully meets the rigid requirements of the heat treating field has been designed by Rolock, Inc., Fairfield, Conn. This serpentine grid is very light in weight yet capable of performing with a minimum of distortion.

Simple in design and fully articulated with loose tie rods, the serpentine grid is constructed with longitudinal bars as the principal load carrying members, spaced with serpentine like intermediate bars which, also, serve to maintain their vertical alignment.

The grid can be fabricated to any size, with or without a side frame depending upon the application.

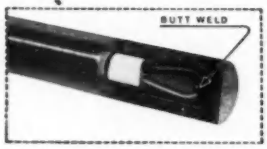
Booth D-230

MS-30—Corrosion Inhibitor

No-Rust No. 6, recently placed on the market by the Gulf Oil Corp., Pittsburgh, Pa., is a thin film corrosion inhibitor which provides approximate surface coverage of 390 sq ft per gal. It is recommended for protection of metal surfaces against corrosion in either indoor or outdoor exposures during domestic or overseas shipment, and for either indoor or outdoor storage

(*Turn to page 90, please*)

"Here's How To Get FASTER TEMPERATURE MEASUREMENT"



In the picture you see Denny Somers, Honeywell Supplies Man of our Philadelphia office, telling a customer all about the new Brown *Fast-Speed Thermocouple* . . . after describing all of the benefits of the HSM Plan for buying pyrometer supplies.

You'll be pleasantly surprised when *you learn* how *the plan* can add convenience and economy to your pyrometer supplies purchasing, too!

There's a Honeywell Supplies Man near you . . . at your local Honeywell office . . . no further away than your phone. Call him in today, and you'll take an easy step in the right direction!

NEW BROWN *Fast-Speed Thermocouple* IS FASTER BECAUSE:

(1) Butt-welding replaces mass of metal at hot junction; (2) Shape of wire adjacent to junction holds back insulator, prevents it from dissipating heat and affecting response of the thermocouple.

Depending upon the application, this *Fast-Speed Thermocouple* is 1½ to 9 times faster than conventional type thermocouples.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4548 Wayne Ave., Philadelphia 44, Pa. *Stocking points in Philadelphia, Cleveland, Chicago, Atlanta, Houston, Los Angeles, and San Francisco.*

MINNEAPOLIS Honeywell
Brown Instruments

One Grinder— Twice the Output

multi-station fixturing doubles piece output in sequence operations

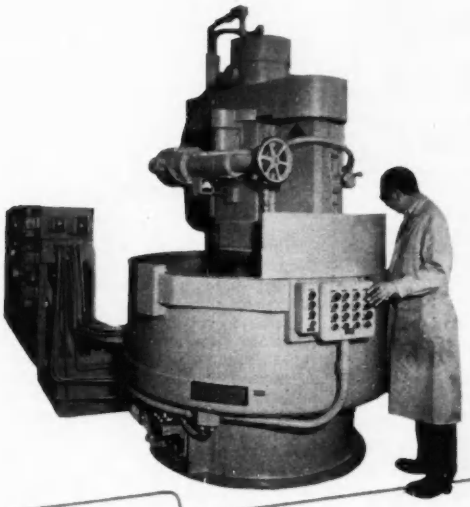
the new BESLY-BOWEN RADIAL HEAD FACE GRINDER

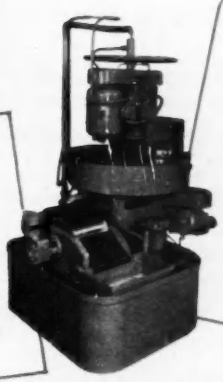
Achieves Time-Saving, Continuous Operation

Totally different in basic design, Besly-Bowen Grinders offer distinct advantages for fast, accurate, *low-cost* mass production. No time is lost by machine waiting for operator to unload and reload fixtures . . . or by the operator waiting for completion of operating cycle. Loads at one station while grinding takes place at another.

Balanced assembly head and a single, massive, slow-moving bearing provides four-way compound movement. Micrometer adjustment with *direct reading — free from backlash* — maintains close tolerance *indefinitely.* Other important features: ample coolant flow without splash or spray, hand-operated or fully-automatic operation, ideal loading height (variable) and small floor space.

Write for full details.





CASE ONE

No. 710-18"-30 hp Besly-Bowen Radial Head Face Grinder with automatic cycle control. Used by automotive manufacturer to grind mating surfaces of cast iron chain case covers. 1/16" stock removed from rough casting. Production rate: 90 surfaces per hour. Accuracy: flat within .002" with approximately 30 micro-inch finish. Fixtures: hand-operated, cam-clamping. Grinder is equipped with two 22" diameter variable speed rotary tables and automatic cycle control. Single cycle cam in feed gives rapid approach, controlled speed and a dwell or spark-out period.

CASE TWO

No. 705-8"-5 hp Besly-Bowen Radial Head Face Grinder for finishing cast iron water pump impellers. Produces 150 parts an hour—removing 1/32" of stock from 6 fins at 15° angle in a single pass of approximately 15 to 20 seconds duration. Head swings clear of the fixture and stops. A limit switch, contacted by grinding head, automatically stops the work spindle rotation.

AVAILABLE IN A FULL RANGE OF SIZES

BESLY

TAPS—the world's most accurate tap.

TWIST DRILLS AND REAMERS—Complete line for every need.

BESLY-TITAN ABRASIVE WHEELS AND DISCS—individually formulated for your job.

GRINDERS that reduce costs on every type of surface grinding.

CHARLES H. BESLY & COMPANY • 118 N. Clinton Street • Chicago 6, Illinois • Factory: Beloit, Wisconsin

"REJECTS CAN BE MINIMIZED WITH THE RIGHT CUTTING FLUID"

THERE is always one *right* cutting fluid for every machining job — one that will do the job better or faster, or both. Take Rudolph's problem of *rejects*. Here is what one company did about it.

THE OPERATION. Grinding the bearing surface and shoulder on engine camshafts of RC60 hardness.

MACHINES AND WHEELS. Camshaft Grinders with 80 grit wheels.

STOCK REMOVAL. Remove .036" on bearing surface and .012" to .020" on side of shoulder.

PREVIOUS RESULTS. Wheel face dressed after 8 pieces, wheel sides after 3 pieces. *Scrap loss 18%.*

WITH STUART GRINDING OIL. Wheels dressed on face and sides after 18 pieces. *No scrap loss.*

You can secure benefits like this. Ask to have a Stuart Representative call.

Are you receiving Stuart's Shop Notebook regularly?

CONSERVE CRITICAL MATERIALS

Use the RIGHT Cutting Fluid

Metal Show Detroit Oct. 15-19 Visit STUART BOOTH No. A-266

D.A. Stuart Oil Co. EST. 1865 LIMITED

2733 South Troy Street, Chicago 23, Illinois

What's NEW at the METAL SHOW

For additional information please use coupon on page 60

(*Continued from page* 88)

for long periods of time in all cases.

According to the company, this material has no tendency to settle or separate in storage, and because of the adhesion characteristics, the coating when once applied and dried will not crack, chip, scale or disintegate at temperatures down to O F, nor will it flow at temperatures as high as 190 F. The coating deposited is not over 0.008 in. thick when dipped at a temperature of 70 F and will dry sufficiently within four hr to permit handling without removal of the coating. This is applied by brushing, spraying, or dipping and is readily removed with petroleum solvents.

Booth G-346

MS-31—Aluminum Etchant

A principal feature of The Diversey Corp., Chicago, Ill., exhibit will be its products used in preparing aluminum for finishing operations.

Included will be recently developed Aluminux, a unique alkaline etchant for aluminum and its various alloys. Aluminux produces a uniform etched or matte finish without buildup of scale on tank walls and coils. A simple but positive means of control has been developed, insuring uniformity from load to load, day to day and charge to charge.

Booth H-253

MS-32—Phosphatizing Compound

A phosphatizing compound for coating steel and iron at low concentrations and for short periods. Keykote is a development of Kelite Products, Inc., Los Angeles, Calif. It is manufactured in powder form that can be used as low as three pH.

Black iron tanks may be employed, and they may be heated by any of the usual methods such as immersion burners, steam coils, or burners under the tanks.

Keykote can be applied by spray or immersion and it can be rinsed.

For spray or immersion the recommended use of Keykote is one ounce per gallon. That concentration produces a pH of 3.45. As iron is dissolved in the

(*Turn to page* 94, *please*)

STROMBERG

CARBURETORS

When You Consider Carburetor *Value*—Put Yourself in Your Customers' Shoes!

•

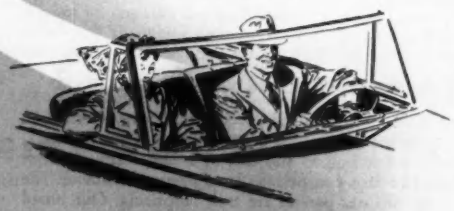
To acquire the priceless asset of owner loyalty is the goal of every motor car manufacturer. Nothing contributes more strongly to the attainment of this end than a product that delivers *lasting satisfactory performance*. That's why it's just good business to specify engine components that maintain your standards of quality and service. In carburetors, Stromberg, because of exclusive design features and mechanical simplicity, is recognized as the carburetor that delivers *better performance longer*. Put yourself in your customers' shoes and make sure that you get lasting performance by specifying Stromberg® carburetors.

®REG. U. S. PAT. OFF.

ECLIPSE MACHINE DIVISION OF
• Standard Equipment Sales: Elmira, N. Y.
• Service Sales: South Bend, Ind.

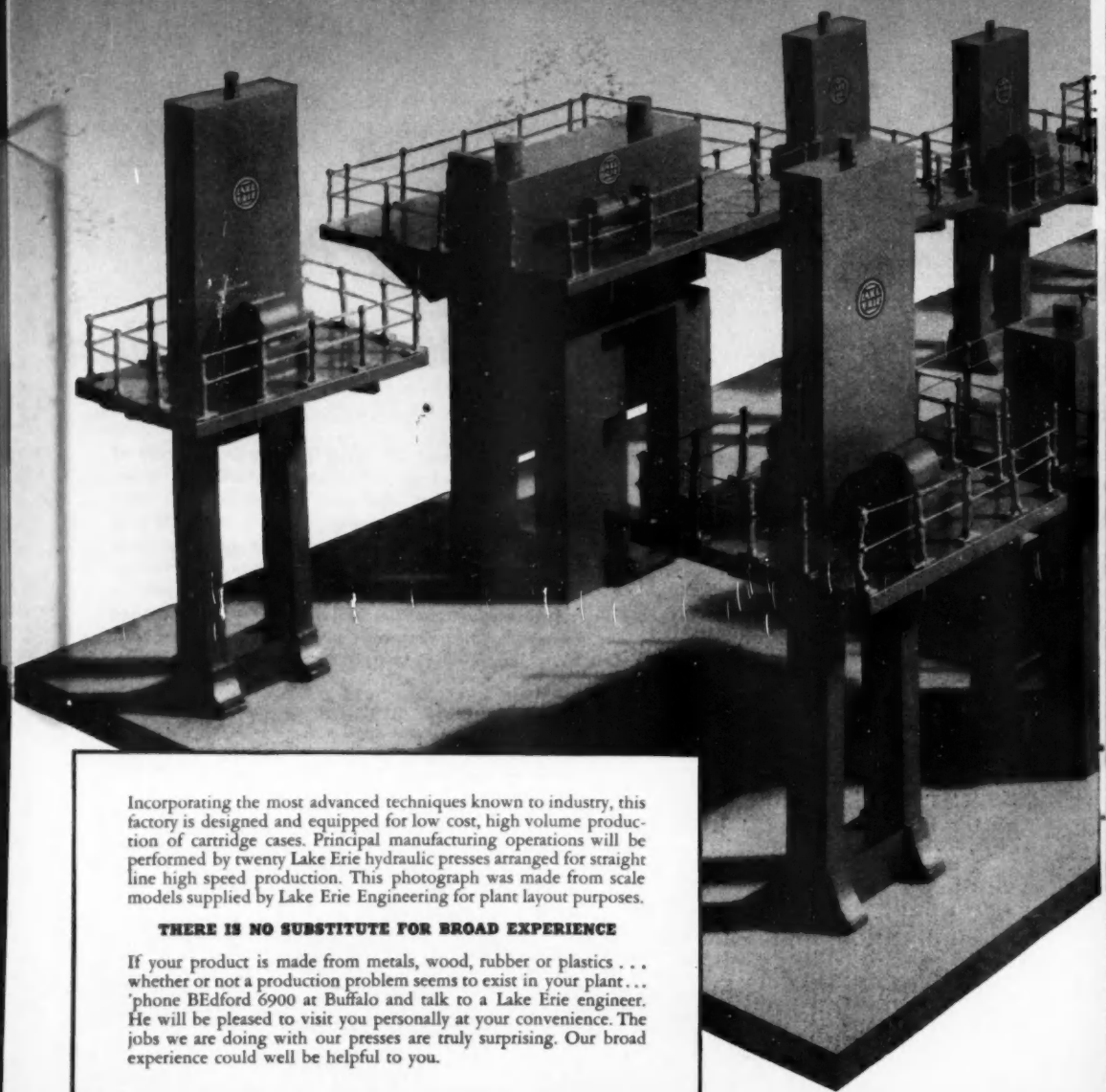
Bendix
AVIATION CORPORATION

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.



20 LAKE ERIE HYDRAULIC PRESSES

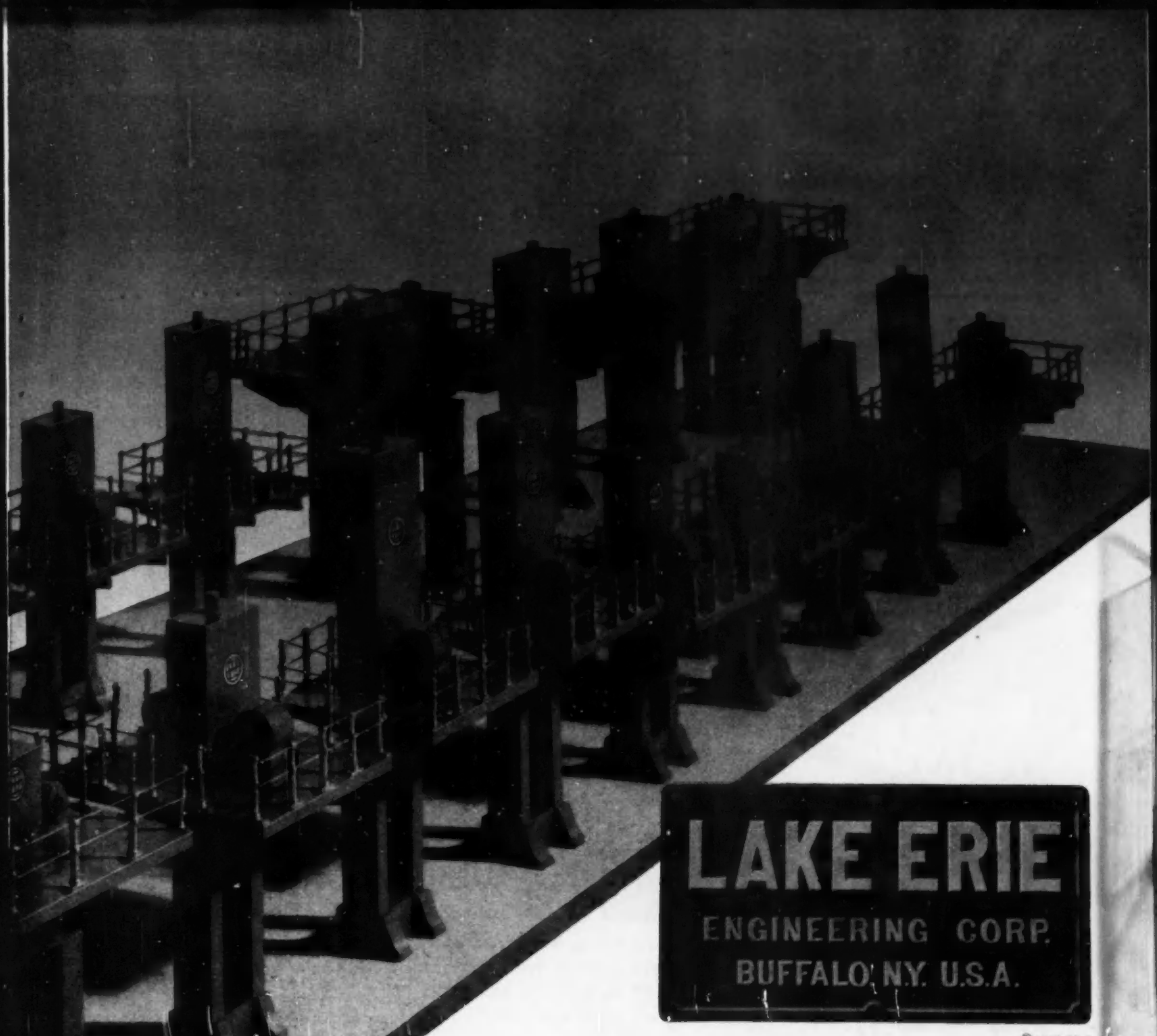
EXCLUSIVE EQUIPMENT FOR NATION'S NEWEST MUNITIONS PLANT



Incorporating the most advanced techniques known to industry, this factory is designed and equipped for low cost, high volume production of cartridge cases. Principal manufacturing operations will be performed by twenty Lake Erie hydraulic presses arranged for straight line high speed production. This photograph was made from scale models supplied by Lake Erie Engineering for plant layout purposes.

THERE IS NO SUBSTITUTE FOR BROAD EXPERIENCE

If your product is made from metals, wood, rubber or plastics . . . whether or not a production problem seems to exist in your plant . . . 'phone BEdford 6900 at Buffalo and talk to a Lake Erie engineer. He will be pleased to visit you personally at your convenience. The jobs we are doing with our presses are truly surprising. Our broad experience could well be helpful to you.



® LAKE ERIE

Rapid firing automatic weapons consume millions upon millions of cartridge cases. The short supply of brass plus manufacturing cost plus the need for earliest possible increased production combined to present our ordnance offices with a problem Lake Erie Engineering was well qualified to help solve.

Lake Erie had already pioneered the design and manufacture of hydraulic presses to both cold extrude and deep draw steel into closed end cylindrical shapes. In this instance, with the selection of steel as the cartridge case metal, Lake Erie's proven "know how" went on to work out press design, capacities and functions to give this plant smooth, low cost production flow in the specified volume.

Twenty Lake Erie hydraulic presses ranging in capacities from 50 to 4,500 tons, will cup, pre-draw, deep draw, taper and head cartridge cases in required calibers.

By coming to Lake Erie, the press equipment to answer this production problem was taken care of at one source. A plus value in the dependable operation of this plant is simplified maintenance, because the hydraulic press equipment becomes standardized . . . exclusively Lake Erie.

LAKE ERIE ENGINEERING CORPORATION

General Offices and Plant: 509 Woodward Ave., Buffalo 17, New York

LAKE ERIE HYDRAULIC PRESSES are available in any size...standard, modified and special design—horizontal and vertical types—for Metal Working—Plastics Molding—Forging—Metal Extrusion—Processing—Vulcanizing—Laminating—Stereotype Molding—Die Casting—Briquetting—Baling—Special Purpose.

For additional information regarding any of these items, please use coupon on page 60

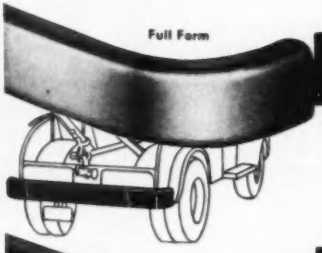
(*Continued from page* 90)
solution good coatings are obtained up to four pH.

The recommended concentration noted above will deposit 80 mg to 100 mg per sq ft after a one-min. immersion or spray and allowing a 10 per cent loss by rinsing.

NASH BODY-GARD BUMPERS are 3 ways better!

Body-Gards PROTECT

High tensile steel and channel type construction combine maximum protection, strength and durability with minimum weight.



Body-Gards FIT

To fit your vehicle, front or rear, Body-Gards are made in any length you specify, in any one of the three styles shown and in five face widths.*

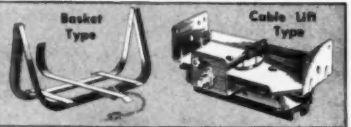
Body-Gards SAVE

By their economical cost and by the repair bills they prevent, Body-Gards help reduce vehicle operating costs.

*Five Face Widths 3½", 4½", 5½", 6" and 6¾" wide.

Body-Gard Bumpers custom built for your truck, bus or trailer are easy to order. Write for information, now

Ask For Details on
NASH TIRE CARRIERS
For Original Equipment or Replacement. The complete Nash line includes the right tire carrier for every type of commercial vehicle.



NASH BROS. COMPANY
2125 DEWEY AVENUE • EVANSTON, ILLINOIS
SEE YOUR EQUIPMENT SUPPLIER OR WRITE DIRECT FOR FOLDER

Booth B-228

MS-33—Steam Jet Cleaner

Livingstone Engineering Co., Worcester, Mass., has developed a heavy duty steam-jet cleaner, known as the Speedylectric model JC-75. Embodying the principle of Speedylectric steam-detergent cleaning, the JC-75 operates at steam pressures up to 200-psig and rinse water pressures to 400-psig. The built in boiler model 600-6, Underwriters' Laboratories listed and ASME Code, provides steam for the cleaning operation and rinse water heating. Featuring complete freedom from fire hazards the JC-75 requires power availability of not less than 60 to 70 kw, 220, 440 or 550 v, three phase power and water supply of 250 to 300 gal per hr.

Booth G-345

MS-34—Heat Exchangers

Improved designs of Platecoils have been announced by Platecoil Div., Kold-Hold Manufacturing Co., Lansing, Mich. These units consist of embossed sheets of 16 gage metal, seam and spot welded to form units through which is circulated, under pressure, the required heating or cooling media for a particular application.

They are supplied in three standard designs—models 60, 70, and 90. Style 60 is of serpentine construction, intended primarily for cooling applications. Styles 70 and 90 are of header type construction for use where steam is the heating medium. All styles can be furnished in stainless or cold rolled steel. A feature of the improved models is the use of new style connection.

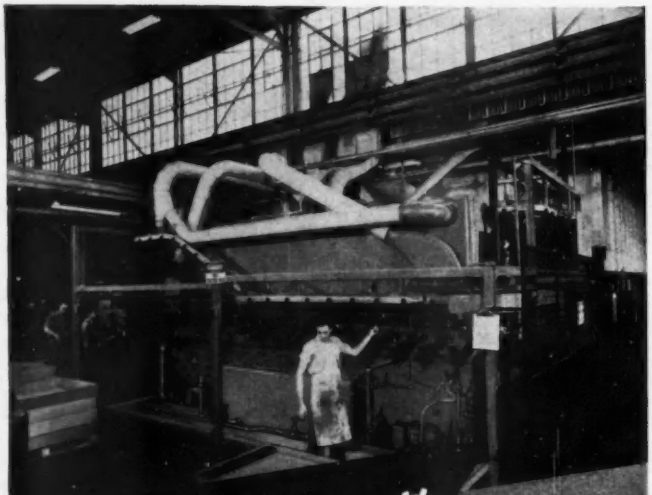
Booth B-247

MS-35—Carbon Determinator

A feature of the Laboratory Equipment Corp., St. Joseph, Mich., exhibit will be the Leco conductometric carbon determinator, model CD-10. This unit consists of a purifying train with rotometer tower and needle valve assembly, mercury manometer, constant temperature water bath, absorption cell with metal base, and Wheatstone bridge and copper oxide catalyst furnace.

One of the important features of the instrument is an amplified cathode-ray tube which indicates when the Wheatstone bridge is balanced. The average carbon analysis for iron and steel of very low carbon contents (below 0.10 per cent) is said to take five min for each sample.

"on the beam" packaging
for SPERRY AIRCRAFT INSTRUMENTS
in SPARKLING Alcoa Aluminum Foil
Safer, all-weather flying . . . that's the big news behind Sperry Gyroscope Company's aircraft instruments. Used by both military and commercial aircraft, Sperry instruments help pilots fly the correct flight path . . . keep them "on the beam."
Often shipped to far-off places for installation, sensitive instruments must be packaged to assure accuracy on arrival. Alcoa Aluminum Foil helps Sperry meet this requirement. Used as the liner for a specially constructed bag, sparkling Alcoa Foil forms a barrier against penetration by such damaging corrosive elements as extreme heat, cold, dirt, moisture.
Is Alcoa Aluminum Foil available for packing *your* product? That depends on current government restrictions. Best qualified to answer this question are leading packaging firms—pioneers in protective packaging, in Alcoa Foil. May we send you their names? Write to: ALUMINUM COMPANY OF AMERICA, 1765K Gulf Building, Pittsburgh 19, Pennsylvania.
ALCOA
ALUMINUM



– complete automatic finishing system for small metal parts!

• WASH
• PHOSPHATIZE
• RINSE
• DRY
• PAINT
• BAKE

at Ypsilanti Plant
FORD MOTOR COMPANY

Hailed as the answer to a multitude of problems encountered in baked enamel finishing of small metal parts is this system designed and engineered by CINCINNATI Cleaning and Finishing Machinery Co. In a single, continuous operation parts are cleaned, dried, and dip-painted . . . in an automatic machine . . . in a space just 24 feet by 15 feet.

Easily adaptable to an almost limitless variety of small parts, this particular installation is in the Ford Motor Company plant at Ypsilanti, Michigan. Generator regulator covers are completely finished at the rate of 1440 parts per hour . . . one every three seconds!

Your particular cleaning and finishing problem may involve a larger or smaller quantity of big or little parts but whatever it is, let CINCINNATI engineers suggest a money-saving solution. Typical installations show savings ranging to 75% on time and cost. New catalog available. Write for your copy.

Cincinnati
CLEANING AND FINISHING MACHINERY COMPANY
315 HECLA STREET IRONTON, OHIO

Expansion

(*Continued from page* 33)

and new forge plant of 230,000 sq ft each and a foundry of 370,000 sq ft. The division also will build a large aircraft engine parts plant at Flint, with 1 million sq ft of space. Chevrolet already is in production of artillery ammunition in facilities which it took over at the Government-owned St. Louis Ordnance Plant.

Pontiac Division has practically completed a new plant of nearly 450,000 sq ft, originally planned for sheet metal operations, but now being tooled for production of medium-bore cannon. A larger plant now under construction, to be used for production of an amphibious cargo vehicle will cover 620,000 sq ft. The division also has built a new driveout and storage building with more than 320,000 sq ft.

Oldsmobile recently completed a new 228,000 sq ft plant originally intended for civilian use, but diverted to production of guns. It also has under construction a new plant of 700,000 sq ft to be used for machining and assembling compressor units for the J-65 jet engine.

Fisher Body Division has taken over the Grand Blanc, Mich. plant used for production of tanks in World War II and since that time occupied by Buick for a service parts warehouse. Fisher will build tanks at the plant, which is being expanded to more than 1.1 million sq ft of manufacturing area, plus a new engineering building of 41,450 sq ft. Fisher also is adding 189,000 sq ft at its Grand Rapids plant for defense work.

Other General Motors divisions also have expansion programs going. Fabricast Div. is putting up a new aluminum castings plant at Jones Mills, Ark. Delco is building a 500,000 sq ft plant at Rochester, N. Y. for small electric motors for defense orders. Brown-Lipe-Chapin Div. is putting up a 400,000 sq ft plant at Syracuse for production of jet engine parts as a Buick subcontractor. Cleveland Diesel Div. is building a 200,000 sq ft plant adjacent to its present Cleveland operation. AC has a new building underway for defense work, which will have 490,000 sq ft of area. Allison is leasing an additional 315,000 sq ft plant in Indianapolis for tank transmission production. Detroit Diesel Engine Div. will spend $1 million for expanding its production facilities. The program includes a 50,000 sq ft addition to be completed by the end of this year for manufacturing purposes, and an additional 26,000 sq ft storage area. Aero Products is doubling the size of its Vandalia, Ohio plant with a 250,000 sq ft addition. The Buick-Oldsmobile-Pontiac Div. has acquired a 255-acre site at Arlington, Texas for a possible future manufacturing or assembly unit. There are no

(*Turn to page* 100, *please*)

KELSEY-HAYES
POWER BRAKING
ASSURES *Feather touch* CONTROL

Today's most advanced development in power braking is **Kelsey-Hayes** amazing "VACDRAULIC", forerunner of even more startling **Kelsey-Hayes** developments for tomorrow's motor cars.

Kelsey-Hayes "Vacdraulic" is the only unit to power the brake action instantaneously, with perfect "feather-touch" control, assuring perfect "pedal feel" in direct proportion to the pressure applied. **Kelsey-Hayes** "Vacdraulic" cuts foot pressure by as much as two-thirds that required for ordinary brakes!

"Vacdraulic", the only unit utilizing complete hydraulic control with a fixed reaction ratio, insures perfect "feather-touch" control at all pressures.

NOW! . . . **Kelsey-Hayes** "Vacdraulic" power brakes are standard equipment on over 100,000 cars of one of the world's leading automotive manufacturers. (**Kelsey-Hayes** engineers will gladly consult with you on the superior advantages of VACDRAULIC POWER BRAKES as original equipment on your new cars.)

K H ASSURES PROVEN PRODUCTS AT

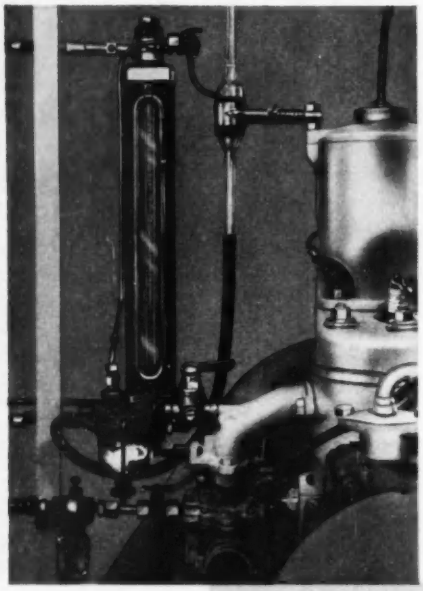
KELSEY-HAYES WHEEL COMPANY

DETROIT 32, MICHIGAN

PRODUCTS: Wheels—Hub and Drum Assemblies—Brakes—Vacuum Brake Power Units—for Passenger Cars, Trucks, Buses—Electric Brakes for House Trailers and Light Commercial Trailers—Wheels, Hubs, Axles, Parts for Farm Implements.

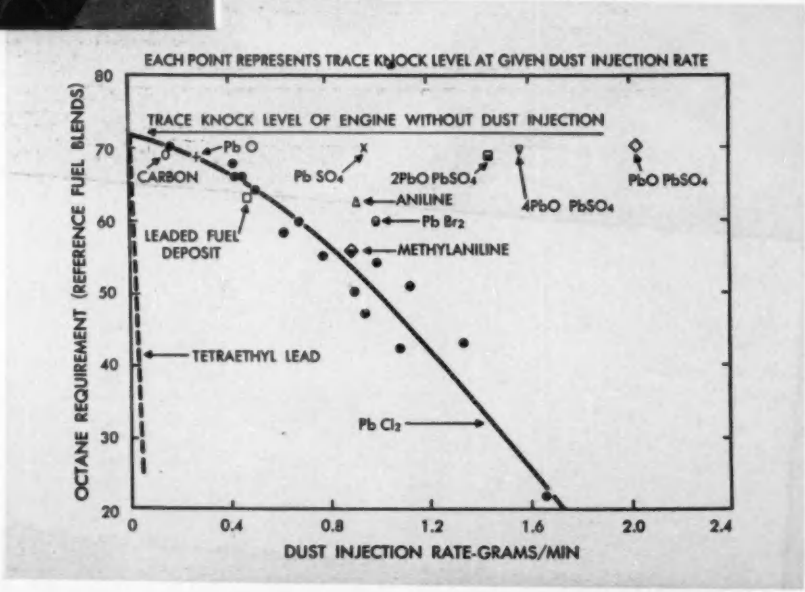
PLANTS: Kelsey-Hayes Plants in Michigan (4); McKeesport, Pa.; Los Angeles, Calif.; Davenport, Iowa; Windsor, Ontario, Canada.

DuPont Petroleum



TO INJECT finely divided deposits and their constituents into the combustion chamber of a test engine, this equipment was used in the Du Pont Petroleum Laboratory. The deposit dusts, which can be seen in the glass receptacle at the lower left, were injected under air pressure.

In the chart below, the effect on knock of combustion chamber deposits and several of their individual constituents is shown. These deposits were introduced into the combustion chamber as finely divided particles.



DUPONT SUPPLIES A COMPLETE LINE OF GASOLINE ADDITIVES

Tetraethyl Lead Compounds (Motor Mix—Aviation Mix) • Antioxidants • Metal Deactivator • Dyes

Research Finds Evidence that the Effect of Engine Deposits in Increasing Knocking Tendency May Not Be Catalytic

The tendency of an engine to knock generally increases with operation, especially during the first few thousand miles. The increase can often be traced to engine deposits and has long presented a real problem to automotive and petroleum engineers.

Since Du Pont is a supplier of tetraethyl lead compounds used by refiners for obtaining knock-free fuel performance, the problem was investigated at the Du Pont Petroleum Laboratory. In order to determine *how* combustion chamber deposits might increase the knocking tendency of an engine, several possibilities were examined... among them the *catalytic* effect of deposits on combustion reactions.

Into the combustion chamber of clean engines, finely divided deposits (and their individual constituents) from both leaded and unleaded fuels were injected and the change in knocking tendency determined.

It was found that none of the deposits or their constituents produced any adverse effect on octane requirement. Surprisingly, some deposit dusts, principally those from leaded fuels, produced a definite *reduction* in octane requirement. As a result of these tests, Du Pont has indications that catalysis may not be a contributing factor in the increase in knocking tendencies caused by deposit formation.

Other investigations at the Du Pont Petroleum Laboratory have measured the effects of deposit volume and thermal insulation on octane requirements. The results of these studies, we believe, will be of considerable value to both petroleum and automotive engineers. They are available to you on request in a paper published by Du Pont.

DU PONT
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Better Things for Better Living
. . . through Chemistry

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IN CANADA: Canadian Industries Limited — Toronto, Ont. — Montreal, Que.

Vast Expansion

(*Continued from page* 96)

definite plans as to when building can start or for what the plant will be used.

Sizable Chrysler Expansion

Chrysler also has a sizable expansion program underway, which it will finance itself, in addition to a large jet engine plant it will build for the Navy. A new parts plant at Indianapolis is well along and will have 782,000 sq ft of space. It is scheduled to be operated by Dodge for defense work and production of transmissions. Work also has started on a new engine plant at Trenton, Mich. to have more than 1 million sq ft of area. A new 1 million sq ft tank plant at Newark, Del. financed by Chrysler, is nearing completion. The press plant in Detroit has been enlarged by 392,000 sq ft and 100,000 sq ft has been added to the Dodge truck plant. Outstate Chrysler operations also are being expanded. The Maywood, Calif. plant is being increased 880,000 sq ft for defense work and is scheduled to revert eventually to passenger car assembly. The San Leandro, Calif., Dodge plant also is being expanded by 730,000 sq ft. Additions also have been made at the Newcastle, Ind., press operations and die shop, totaling about 25,000 sq ft.

Chrysler also has two very large military projects for Government-owned facilities. It will build and operate for the Navy a 1.6 million sq ft jet engine plant north of Detroit. It also is taking over a Government-owned plant in New Orleans for production of air cooled tank engines. A large tooling job will be required, calling for 1350 machine tools, 4800 fixtures, 8500 tools, 7500 gages, and a large complement of heat-treating furnaces, conveyors, materials handling equipment, and similar items.

Studebaker will use its new plant at New Brunswick, N. J., originally planned for automobile assembly, as a feeder unit for its jet engine assembly job to be carried on in South Bend. The New Jersey plant has 400,000 sq ft of space. Studebaker also has taken over a 526,000 sq ft Government-owned plant in Chicago where the company built aircraft engines during World War II. It likewise will be used as a feeder plant.

Packard Tops Independents

Packard has the largest expansion program primarily for defense work among the independents. It will build a $15 million plant at Utica, Mich. for jet engine production. The plant has 700,000 sq ft of space. Also, a 415,000 sq ft service parts warehouse will be erected adjacent to the Utica plant. Packard also has acquired a 327,000 sq ft plant in Detroit to quadruple the size of its forge operations, and will spend $11 million for equipment.

Willys-Overland will spend $7 million for tooling a former Chevrolet plant at Anderson, Ind. which Willys purchased for production of jet engine parts. The plant has 226,000 sq ft of space. Willys also in July took over operation of the 342,351 sq ft Government-owned plant of Aluminum Forgings, Inc. at Erie, Pa.

Kaiser-Frazer has been able to arrange its facilities at the Willow Run plant for combined automotive and aircraft production. It currently is devoting about 1 million sq ft or roughly a third of the plant area for aircraft work. K-F also has doubled the size of its Oakland, Calif., aircraft division, erecting a new building with 50,000 sq ft of space for production of plane parts.

Between the end of World War II and the first of this year, Nash expanded its facilities by more than 1.6 million sq ft and currently is expanding its Kenosha aircraft engine facilities with a new building of 50,000 sq ft.

Supplier industries furnishing both civilian and military components also have been expanding facilities. Because the number of such companies is so great, their activities are listed in tabular form at the beginning of this article.

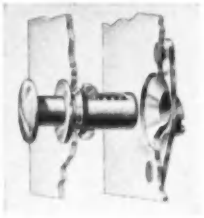
. . . when hunting in the "field" of metal finishing, a good point for engineers to remember is the well-beaten path to Motor Products Corporation.

Year after year, the major automotive manufacturers have turned to Motor Products for many diversified, quality metal parts, both functional and eye-appealing, such as window ventilators, garnish mouldings, instrument panels, radiator grilles and glove compartment doors . . . all individually formed to specification.

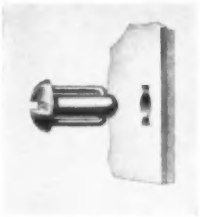
MOTOR PRODUCTS CORPORATION

11801 Mack Avenue • Detroit 14, Michigan

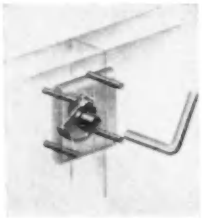
3 ways to save on assembly costs



QUICK-LOCK For fastening removable access doors and panels. Because of its ease of installation, QUICK-LOCK is ideal for assembling removable panels. A 90° turn locks it in place. Stud is self-ejecting when unlocked; visual inspection shows whether fastener is locked. Spring loading takes initial load; solid supports carry increased load. Available in a wide range of sizes.



SPRING-LOCK One-piece fastener for blind holes has load-carrying steel spring wire. Spring steel arms lock fastener securely, prevent loosening under vibration. SPRING-LOCK will work with varying panel thicknesses, locks with a twist of the wrist. SPRING-LOCK is now available in high-impact plastic. The molded design permits heads to be made in various shapes for refrigerator shelf supports, washer knobs, brackets. Available in a wide variety of shapes and sizes, and also in custom designs.



ROTO-LOCK Serrated, tapered cam is engaged by formed lug as fastener is locked. Cam action draws panels together tightly, insures locking even under conditions of misalignment. Opens easily for demounting. ROTO-LOCK carries heavy tension and shear loads; can be used for air and water-tight seals; recesses completely into panels. Solidly built without springs or delicate mechanical parts, unaffected by arctic temperatures or field service.

Simmons Fasteners are widely used in refrigerators, washing machines, electrical equipment, electronic assemblies, prefabricated portable shelters, coolers, demountable furniture. Every Simmons Fastener is a service-proved design with a long record of assembly-cost saving in many industries.

If you are interested in cutting your costs, turn to Simmons Fasteners—the fasteners with *uses unlimited*. Write for samples and catalogs today.

SIMMONS FASTENER CORPORATION
1749 North Broadway, Albany 1, New York

Simmons
QUICK-LOCK
SPRING-LOCK
ROTO-LOCK

PUBLICATIONS

(*Continued from page 60*)

D-124 Hydraulic Valves

Rivett Lathe & Grinder, Inc.—Illustrated and described in Catalog Section no. 203, are 138 different models of hydraulic valves, each in varying sizes.

D-125 Positioning Control

Conoflow Corp. — An eight-page illustrated bulletin, C-1, now available, fully describes Cono Rotomotor, a completely pneumatic gear-driven operator for throttling control service.

D-126 Remote Controls

American Chain & Cable Company, Inc.—The Key to Remote Control is the title of a new 12-page booklet just published. It gives a description of Tru-Lay flexible push-pull controls.

D-127 Conveyor

The E. W. Buschman Co.—A bulletin on the Buschman "Trojan" portable conveyor-loader-stacker is now available.

D-128 Chucks

Skinner Chuck Co.—Just published is a 68-page booklet entitled, "Chucks and Their Uses."

D-129 Hydraulic Vise

The Columbian Vise & Mfg. Co.—Descriptive bulletins and catalog pages on the no. 1004 hydraulic vise are offered.

D-130 Motor Controls

The Clark Controller Co.—Just released is a new edition of "Controlog," a Digest of Motor Controls. This 88-page illustrated book contains information on the complete line of Clark ac and dc motor starters, motor control centers, contactors, relays and other accessories.

D-131 Iron Hand

Sahlin Engineering Co.—Advantages of automatic unloading of power presses with the Sahlin "Iron Hand" are described and illustrated in an eight-page catalog just issued.

D-132 Tools

Super Tool Co.—A 22-page new price schedule has been issued.

AUTOMOTIVE INDUSTRIES
Keeps You Informed

For Accurate Case Depth and Carbon Control
we rely on
HEVI DUTY
Carburizing
FURNACES
says
Burgess Norton
MANUFACTURING CO.
● Burgess Norton uses 12 Hevi Duty vertical retort furnaces for carburizing piston pins to rigid case depth and carbon specifications. Metallurgical tests and quality control prove that each pin receives uniform heat treatment. These rugged furnaces operate 24 hours a day, six days a week with minimum down time.
Learn how dependable Hevi Duty vertical retort furnaces provide accurate heat treatment on a production basis. Write for your copy of bulletin HD-646 — today.
See the Hevi Duty Vertical Retort Furnace Booth D-350 at the Metal Show
HEVI DUTY ELECTRIC COMPANY
HEAT TREATING FURNACES HEVI-DUTY ELECTRIC EXCLUSIVELY
DRY TYPE TRANSFORMERS — CONSTANT CURRENT REGULATORS
MILWAUKEE 1, WISCONSIN

Spanish Automobile Production

(*Continued from page* 41)

rear axle and independent suspension all round. The intention is to use Barcelona for all experimental and high precision work, and for big production to be carried out at a factory now being erected in Madrid. This new plant will have a covered area of 860,000 sq ft and will be used for the production of a five-ton truck with light-alloy V-type engine and a creeper type agricultural tractor. The Madrid factory will eventually employ 7000 men, compared with the 3500 at present employed at Barcelona. All the experimental and preliminary work on the truck and the tractor will be carried out at Barcelona and only when they are ready for production will they be sent to Madrid.

Some aviation engine work is being carried out by ENAS, the model being the Hispano-Suiza 12-cylinder liquid cooled type. It is recognized, however, that a piston engine of this size is bound to be replaced by jet turbines, and plans are being studied for the production of an engine of this type in Spain. However, this aviation section will be moved out very shortly and turned over to private enterprise. The Hispano-Suiza company is no longer building automobiles, but has a factory at Barcelona engaged in machine tool production. Plans are very well advanced for the production in Spain of the Italian Fiat 1400 model. This operation will be State-controlled at the beginning, with Fiat and its banking interests holding 49 per cent of the stock, while 51 per cent will be in the hands of the Spanish government. Eventually the government will withdraw in favor of private enterprise. Fiat's part in this will be the supply of drawings, jigs and tools, personnel and methods. All the indications are that this factory, now being erected in Barcelona, will limit itself to the passenger car model.

Until recently a company known as the EUCORT attempted to build a copy of the German DKW small car. The venture was not a success, the company being declared bankrupt last year. At the present time negotiations are in hand for the formation of a new company which would build the DKW under license. There appears to be a good local market for a small car of this class.

Elizalde, building high-grade cars before the civil war, has recently been reorganized under private ownership for aviation engines only.

Among the difficulties experienced by the Spanish automobile industry is the absence of a parts industry, the scarcity and low quality of national coal, the shortage of raw materials and the insufficiency of the electric generating stations. A certain amount of current is obtained from water power, but this does not give the desired reliability, and a plan is going through for the erection of thermal generating stations by the side of the coal mines which will burn the low-grade coal not suitable elsewhere.

To meet the ball bearing shortage the SKF company has erected a factory under the joint scheme of private enterprise and State initiative. It is producing all the sizes and types of ball bearings in general use. The scope of this will be enlarged and eventually the State will transfer its rights to private ownership.

Because of the special conditions, the manufacturer is obliged to make many of the parts which in other countries would be purchased from supplier firms. ENAS, for instance, produces its own frames, shock absorbers, bumpers, springs, clutches, some electrical equipment and body trimmings. An exception is made for fuel injectors, which are imported from Germany. Probably it will be some years before the country has an industry of sufficient importance to support its own equipment firms; also general economic conditions may improve sufficiently to leave a surplus for purchases abroad.

IN STEP WITH THE NEWEST
in cooling system engineering

DOLE
DV
THERMOSTATS
ACCEPTED BY LEADING AUTO AND TRUCK MANUFACTURERS

As cooling systems have advanced Dole Thermostat design has moved with them. Smaller radiators, pressurized systems and other such basic changes introduced new factors in thermostat performance. DOLE DV's, with a new operating principle, met that challenge.

In new cars of recent years DOLE DV's assure effective cooling system control. They provide quick warm-up, fast heater output and savings in gasoline, oil and motor wear.

CONTROL WITH DOLE

THE DOLE VALVE COMPANY
1901-1941 Carroll Avenue, Chicago 12, Illinois
PHILADELPHIA • DETROIT • LOS ANGELES

Lacquer

PUBLISHED PERIODICALLY BY HERCULES POWDER COMPANY IN THE INTERESTS OF BETTER FINISHES AND REFINISHING

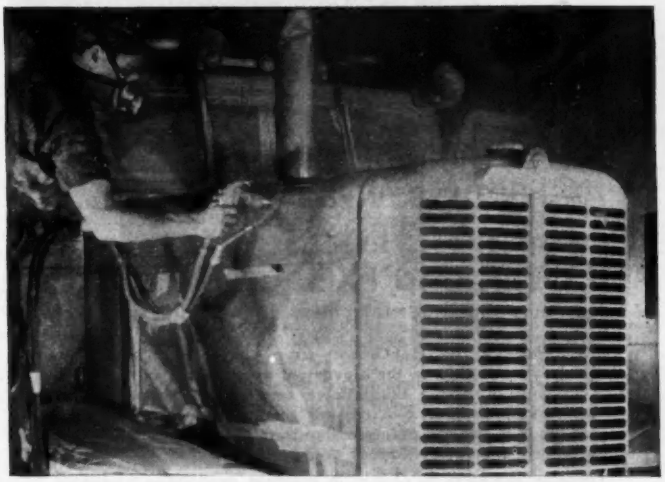
Hot-Spray At Oshkosh Motor Truck Improves Gloss, Speeds Production

Heavy-Duty Trucks Get Heavy-Duty, Low-Cost Finish

Oshkosh 4-Wheel and 6-Wheel drive trucks are designed specially to perform in fields which are too severe for the conventional rear drive trucks. Manufacturing specifications call for a finish that is equally durable—and actual service has proved that hot-spray lacquer does the job.

According to Mr. A. E. Stoll, Production Manager, "Hot-spray lacquer has improved our finish by better gloss, has cut the over spray by use of 60% less thinners and eliminated periods of blushing.

"The elimination of blushing by use of hot-spray solved our problem of slow-up in finish painting during periods of high humidity, which in our climate is quite frequent in summer and fall.



Durable hot-lacquer finish being applied to heavy-duty Oshkosh truck.

"We are satisfied that hot-spray lacquer has improved our finish and increased our painting production."

Typical fleet of Oshkosh trucks, in service for City of Yonkers, N. Y.

NEW MILITARY LACQUER SPEC.

A new military specification for lacquer is now issued and official. Identified as "Military Specification MIL-L-11195 (ORD) Lacquer, Lustreless, Hot Spray (For Ammunition)". Hercules will send you full information on hot lacquer, types of heating equipment available, and the performance record of hot lacquer in many industries.

HERCULES POWDER COMPANY

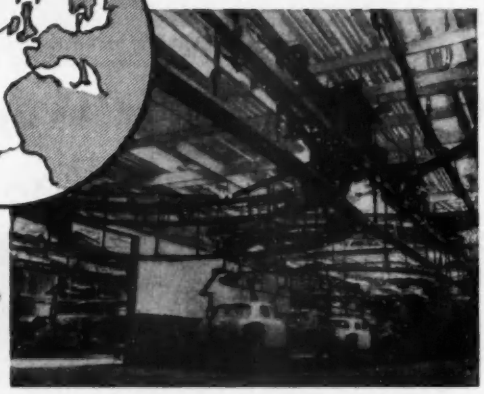
Cellulose Products Department
946 Market Street, Wilmington, Delaware

CLSI-13

HERCULES DOES NOT MANUFACTURE LACQUERS OR LACQUER EQUIPMENT. ONLY THE RAW MATERIALS FROM WHICH LACQUERS ARE MADE

The FIRST Cable
to link the Old and New Worlds

was completed by Cyrus W. Field, Aug. 5, 1858—revolutionizing then existing communications.



JERVIS B. WEBB COMPANY

was the FIRST to develop POWER and FREE CONVEYORS

—an outstanding development in materials handling.

More important than movement from "here to there" is the "pacing"—the setting up the movement of materials so the operators can work in rhythm. Webb Power and Free Conveyor Material Handling Systems give this "rhythm"—yet allow off-the-line placing of loads to desired points without interrupting the flow. They reduce costs, increase efficiency and productivity.

Offering complete flexibility in meeting production problems, Power and Free Conveyors can be tailor-made to your requirements —for any plant large or small. Some of their advantages include:

- Loads are *pushed*, rather than *carried*, on Webb "Power and Free Rail" conveyors.
- Manual or automatic switching of loads either *from* or *to* the main "Power" line.
- Loads may be lowered vertically from the "Power" line . . . anywhere along the route.
- Automatic dispatching of loads to distant points by presetting carriers for a given destination.
- Accumulation of loads for "banks" by gravity from "Power" line to "Free" line eliminates floor storage space waste.
- Momentary stopping of loads anywhere along the route, by disengaging "Free" trolleys from "Power" pushers.

CONVEYOR ENGINEERS AND MANUFACTURERS

JERVIS B. WEBB COMPANY

8937 ALPINE AVE
DETROIT 4, MICH

OFFICES IN PRINCIPAL CITIES

CALENDAR

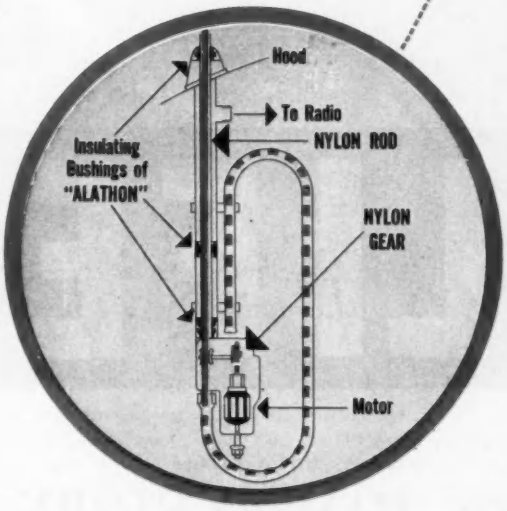
OF COMING SHOWS AND MEETINGS

36th International Motor Exhibition, London, England ..... Oct. 17-27
National Metal Congress and Exposition, Detroit, Mich. ..... Oct. 15-19
NAM Institute on Industrial Relations, Lake Placid, N. Y. ..... Oct. 15-19
ASTE South Central Conference, Evansville, Ind. ..... Oct. 19-20
SAE National Diesel Engine Meeting, Drake Hotel, Chicago, Ill. .... Oct. 29-30
SAE National Transportation Meeting, Knickerbocker Hotel, Chicago, Ill. ..... Oct. 29-31
AGMA Semi-Annual Meeting, Edgewater Beach Hotel, Chicago, Ill. Oct. 29-31
SAE National Fuels and Lubricants Meeting, Drake Hotel, Chicago, Ill. ..... Oct. 31-Nov. 1
National Tool & Die Manufacturers, St. Louis, Mo. ..... Nov. 1-4
American Petroleum Institute (31st Annual Meeting), Chicago, Ill. Nov. 5-8
Second Annual Motorama, Los Angeles, Calif. ..... Nov. 7-11
American Society of Mechanical Engineers (annual meeting) ... Nov. 25-30
Ninth Annual Pittsburgh Diffraction Conference ..... Nov. 29-30
Motor and Equipment Wholesalers Ass'n (Annual Convention) Chicago, Ill. ..... Dec. 5, 6, 7

1952

Brussels Automobile & Truck Show, Brussels, Belgium ..... January
42nd National Motor Boat Show, New York City ..... Jan. 11-19
Plant Maintenance Show, Phila., Pa. ..... Jan. 14-17
SAE Annual Meeting, Detroit, Mich. ..... Jan. 14-18
Society of Plastics Engineers, Inc. (eighth annual technical conference), Chicago, Ill. ..... Jan. 16-18
National Transport Vehicle Show & Fleet Maintenance Exposition, New York ..... Feb. 26-28
Pacific Automotive Show, Los Angeles, Calif. ..... Feb. 28-Mar. 2
ASTM Spring Meeting, Cleveland, Ohio ..... Mar. 3-7
Fifth National Plastics Exposition, Phila., Pa. ..... Mar. 11-14
ASTE Industrial Exposition, Chicago, Ill. ..... Mar. 17-21
Geneva Automobile & Truck Show, Geneva, Switzerland ..... Mar. 20-30
American Society of Lubrication Engineers, Seventh Annual Meeting and Lubrication Show Cleveland, Ohio ..... Apr. 7, 8, 9
Western Highway Institute, Palm Springs, Calif. ..... Apr. 17-19
API Div. of Refining, San Francisco, Calif. ..... May 12-15
American Society for Quality Control (sixth annual meeting), Syracuse, N. Y. ..... May 22-24
American Society for Testing Materials (annual meeting) New York City ..... June 23-27

Du Pont NYLON plastic drives new automatic antenna



When driver pushes button, motor-driven worm gear turns nylon gears, which turn spring-loaded pulleys. Nylon rod is driven up by pulleys, forcing "live" members upward. Rod coils into trombone-like shape (dotted line) when antenna is lowered. Insulating bushings are made of Du Pont "Alathon"* polythene resin, an outstanding high-frequency insulating material. *TRADE-MARK

Only nylon meets mechanical and electrical requirements for Packard antenna

When the Casco Products Corp., Bridgeport, Conn., designed this new motor-driven antenna for Packard automobiles, plans called for a 4½-foot flexible rod to raise and lower "live" members. This strip had to have an unusual combination of properties. Most important of these: it had to be rigid enough to force the antenna up and down, yet flexible enough to fold into a trombone-like position when the antenna is down; and the rod had to have good dielectric properties.

Only Du Pont nylon plastic was found to have all of the properties required. The nylon driving rod has excellent mechanical strength and very low deformation under load, yet is flexible even at extremely low temperatures. The curvature in the trombone-like position has a 4-inch radius, and the nylon rod, while rigid enough to raise and lower the antenna, still takes sharp curves easily. And nylon's electrical properties meet the requirements of the application.

In addition, two nylon gears engage a steel worm gear which is an extension of the armature shaft. They're molded directly onto the shafts to which driving pulleys are attached. The nylon gears are quiet and long-lasting. Both rod and gears have been subjected to as many as 80,000 cycles—many times more than they could possibly be called on to withstand during the life of any car. Neither shows any sign of wear.

This is one of many uses for nylon plastic in the automotive industry—gears, bearings, valve seats, and such electrical parts as fuse holders, insulator bushings, and switch components. Demand for nylon currently exceeds supply. However, we suggest that you investigate its versatile properties for future application. We will gladly discuss the availability of quantities for development work. For further information on nylon and other Du Pont plastics, write:

E. I. du Pont de Nemours & Co. (Inc.),
Polychemicals Department, District Offices:
General Motors Building, Detroit 2, Michigan
350 Fifth Avenue, New York 1, New York
7 South Dearborn Street, Chicago 3, Illinois
845 East 60th Street, Los Angeles 1, California

DU PONT
REG. U.S. PAT. OFF.
PLASTICS
Better Things for Better Living
. . . through Chemistry

in the October 1 LIFE

appears Chapter II of the RAMSEY STORY

To you and to us, who are "behind the scenes" of the Automotive Industry, the struggle to achieve and maintain precision in the face of mass-production, is well known. With the man behind the wheel, however, it is a different story.

In the wake of ever-improving performance in his cars, with less and less maintenance required to keep them running, and with lower and lower engine-repair bills as compared to 20 years ago, the American Motorist has been educated to take precision for granted.

He has little conception of the years and years of engineering that were necessary to maintain hair-splitting accuracy in a part that is produced at a rate of thousands per hour. He is unfamiliar with the meaning of this precision, in terms of economy, longer engine life, etc., as explained in the LIFE ad reprint at right.

This advertisement, No. 2 in a series, is Ramsey's contribution to the total industry effort to bring the FACTS of MASS-PRODUCTION PRECISION to the AMERICAN PUBLIC.

It is designed to bring to over 20 million LIFE readers, a greater appreciation of the hair-splitting precision built into the engine of every American car, truck, bus and tractor.

Ramsey Corporation
St. Louis 8, Missouri
Subsidiary of Thompson Products, Inc.

G1006

You can thank RAMSEY ENGINEERING

for splitting hairs that help SPLIT MOTORING COSTS

What do things like . . . parallelism . . . flatness . . . finish . . . mean to you?

To your car, they mean life! They're important! They describe certain precision qualities in piston rings.

The more precision in your engine parts, the longer your car will run . . . the longer you'll have pep . . . power . . . and save on gas and oil.

That is why you should know about the success of Ramsey Engineering in mass producing this precision into the piston rings for your car.

You can thank Ramsey Engineering for splitting hairs to the millionth of an inch to meet a wartime piston ring emergency.

This achievement is a typical example of Ramsey Engineering at work to

. . . increase precision

. . . reduce the cost of precision

Ramsey met the emergency demand for faster production of military aircraft rings by producing them hundreds-per-hour faster than ever before believed possible . . . by developing special machinery which made possible a finish measured at 6 micro inches . . .

That is 6 millionths of an inch . . . that's less than 1 three-hundredths the thickness of a human hair . . . that's splitting hairs pretty thin . . . that's exacting precision spelled with a capital P.

Today, all Ramsey production utilizes the precision lessons learned through the micro-lapping of military aircraft rings and through the production of tens of millions of rings for automotive engines for car factories and car owners . . . truck and bus operators . . . farm, diesel and industrial engine users.

Yes, thanks to Ramsey Engineering's success in splitting hairs that help split motoring costs you are assured an extra measure of life-prolonging precision in every product bearing the name of the maker . . . Ramsey.

Ramsey Corporation Piston Rings

Makers of RAMCO 10-Up Piston Rings, Ramco Inner-Rings, Ramco Piston Skirt Stabilizers, Seal-Tite and Oil-Tyte Piston Rings, Spiralox Retaining Rings, Spira-Seal Grease Seals and Dust Seals, and special rings for Automotive and Industrial Application. Ramsey Corporation, General Offices St. Louis, Mo., a Subsidiary of Thompson Products, Inc. Factories: St. Louis and Sullivan, Mo.; Fruitport, Mich.; Toronto, Canada.

SETTING NEW AND HIGHER STANDARDS FOR HARNESSING ENERGY TO MAKE ENGINES AND MACHINES BETTER SERVE AMERICA

AIRBRIEFS

(*Continued from page 58*)

British Independence

The British aircraft designer is assuredly one of the most independent-thinking creatures alive and this characteristic was one of his greatest assets during the long years when British designers led the world with their products. It now appears a fault, for their recent offerings indicate strongly that their independent traits have now become mere hard-headedness. The designer as an artist was dead a decade ago when the scientific laboratory and the calculating machine took over his job. This transition was made smoothly in the United States, where industry engineers willingly accepted wind tunnel findings as basic data for design purposes. In England, in contrast, the designers stubbornly ignore scientific research and persist in their time-tested "cut and try" approach to the problem. (This might be as much due to a slow-moving research program as to designer recalcitrance.) A case in point is the new Short SA/4 four-jet bomber, in which the designers quite crudely placed the engines one above the other in two nacelles instead of the virtually drag-less use of individual, mid-wing nacelles for each engine. Our NACA laboratories long ago pointed out that an engine nacelle can be properly designed to produce not only no drag increase on the wing but actually reduce wing drag by the presence of a properly-shaped nacelle.

First U. S. Jet Transport?

It is elemental that all of the U. S. transport builders (Boeing, Martin, Douglas, Lockheed and Convair) have long had jet transport design studies in the files and both Boeing and Lockheed have permitted sketches of their designs to circulate freely. In the 1946-47 period all of these companies were in a scramble for airline orders but airline reticence mounted to a firm resistance and the flood of piston-transport orders of the past three years has crystallized airline planning for at least the next five years. However, Lockheed now reveals that it has completed design work on its jet transport and, although there are no orders in sight, will hold the plans in readiness for the first construction order. Lockheed Chief Engineer Hall Hibbard says that he has "frozen" the design and that any future changes will be only minor. Thus, amidst the hue and cry of British leadership in the jet transport field, we find that a U. S. jet transport plane has been completely designed and is ready for prototype construction—but that no one is willing to give the signal. We suggest that this is the final answer to those critics of the lack of a U. S. jet transport, particularly those who have strongly suggested that the technical talent of the manufacturing industry wasn't up to the job. The simple fact, as we have said here so often, is that U. S. airlines "don't want" a jet transport.

Air Force Single-Mindedness

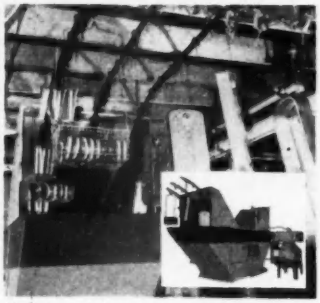
It is popular to suppose that the Air Force makes exhaustive tests of prototype aircraft and that this testing goes on even after production airplanes go into service. This is true in only one respect: determination of the maximum combat performance of the airplane. Air Force test pilots spend countless hours seeing just how fast, how high and how long a new combat airplane will fly but the astonishing fact is that the Air Force never does determine most of the things that the civilian manufacturers are required to demonstrate to the Civil Aeronautics Administration in order to obtain the all-important airworthiness certificate. Putting it simply, the Air Force simply answers the question: "How good is this airplane?" whereas the CAA demands and obtains answers to the question: "How safe is this airplane?" and therein lies the enormous difference between the two Government agencies. For example, the Air Force, nor its contractors, never bother to determine

(*Advertisement*)

PHILLIPS PRODUCTION DEGREASING BULLETIN

PRODUCTION LINE DEGREASER SAVES OVER 50 MAN-HOURS PER DAY!

Steger Products Builds Phillips Monorail Conveyor Type Unit Right Into Production Line



Parts emerge from degreaser on three separate conveyor lines ready for the next operation. Inset shows degreaser complete with solvent recovery still.

Steger Products Manufacturing Company saw the need for integrating fast, efficient degreasing with their complete production line. So in place of hand dipping in liquid solvent, (a slow, costly degreasing process) they now use a fast, efficient Phillips monorail conveyor type degreaser. All parts for the various products produced enter the degreaser on three separate monorail conveyor lines and emerge completely cleaned *without being handled by any worker*. Steger estimates that this automatic degreasing saves over 50 man-hours per day over the old method. Without this production degreaser the whole line would be slowed to the tempo of out-moded cleaning methods.

As a consequence many more units of each part are degreased in a day's time—completely—automatically. And the parts are thoroughly clean and ready for the next operation in the production line.

This is just one example of the efficiency effected by many manufacturers who use fast, economical Phillips vapor degreasers in their production operations. Check with Phillips today for the answer to your degreasing problems.

New Illustrated Degreaser Bulletin Offered

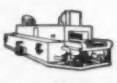
Phillips Manufacturing Co. offers its newly published degreaser catalog to any one who wishes to obtain a copy. It describes the full line of Phillips degreasers and shows many various and interesting industrial applications. Write Phillips Manufacturing Co., 3465 West Touhy Avenue, Chicago 45, Illinois.

BATCH TYPE DEGREASERS

COMBINATION DEGREASERS

"ROTOMATIC" DEGREASERS

CONVEYOR TYPE DEGREASERS



"TORRENT" WASHERS

Why tap?

SAVE TIME AND MONEY WITH

SHAKEPROOF

T. M. Reg. U. S. Pat. Off.

THREAD-CUTTING SCREWS

AND GET STRONGER, TIGHTER FASTENINGS, TOO!

- separate tapping is completely eliminated—no tapping time or tool costs!
- each screw fits tight in its own self-cut, mating thread—powerfully resists loosening!
- [illegible] strength permits use of smaller or fewer fastenings—saving space and weight.

WRITE FOR YOUR FREE COPY OF THIS BOOKLET TODAY . . . and see how SHAKEPROOF Thread-Cutting Screws will speed urgent production in your plant.

SHAKEPROOF Inc.

"Fastening Headquarters" Trade Mark

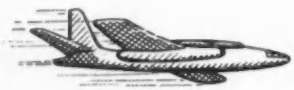
A DIVISION OF ILLINOIS TOOL WORKS

2501 North Keeler Avenue • Chicago 39, Illinois

In Canada: Canada Illinois Tools Ltd., Toronto, Ontario

Forgings by KROPP

One-piece forged part for a large landing gear. 4'1½" long – 2'6½" wide across the "Y" – weight 285 lbs.



Only the best of steel is good enough to take the shock and stress of landing tons of fast moving weight in the heavy planes of today. And the best steel is *forged steel* . . . best in toughness, fatigue resistance, uniformity and savings in weight. The amount of improvement imparted to the steel by forging is determined by the equipment used and the skill of the craftsmen.

Kropp forgings are forgings at their best . . . produced with modern equipment by skilled hammermen, die makers and machinists with many years of forging experience.

That's why Kropp is depended upon to make so many parts for America's defense . . . thousands of pieces daily for planes, ships, tanks and guns to help keep America strong.

The complete drop, hammer and upset forging facilities of *America's Number One Forge Plant* are at your service.

KROPP FORGE COMPANY
5301 W. Roosevelt Rd., Chicago 50, Ill.

Are you receiving "FORGINGS" . . . . the KROPP publication for industry? If you want to keep current on forging facts, send us your name and address and ask for "FORGINGS".

the complete range of runway length requirements under varying gross weights for its aircraft, their exact performance under engine failure conditions on takeoff, or while climbing out of the airport, or their exact performance at various weights under engine-out conditions in multi-engine aircraft. A case in point is the North American B-45 Tornado four-jet tactical bomber now seeing service in Korea. The Air Force knows full well the speeds, altitudes and ranges of the B-45 but to this day has never bothered obtaining runway or engine-out performance of this airplane. Therefore, it simply does not have the data needed to appraise this airplane as a typical commercial jet transport! It is for this reason, and as a result of this short-sighted policy, that the Prototype Advisory Committee must perform these tests on a borrowed B-45—provided, of course, that funds become available for the purpose. As of this writing, an item of $600,000 is in the Department of Commerce budget for this purpose but has not yet been appropriated.

BOOKS . . .

THE STRUCTURE AND MECHANICAL PROPERTIES OF METALS, by *Bruce Chalmers*, published by *John Wiley & Sons*. The second volume in a series of monographs on metallic materials, this study is aimed at providing the simplest possible picture of the structure of metals and alloys and its relation to mechanical properties.

HERBERT H. DOW, PIONEER IN CREATIVE CHEMISTRY, by *Murray Campbell* and *Harrison Hatton*, published by *Appleton-Century-Crofts*. This is a fascinating biography of the founder of what is today The Dow Chemical Co. The story of a real American industrialist, it reveals that added to his other accomplishments was his battle almost single handed with the German chemical cartels of his day. This is a story of one of the great men who fought to make the U. S. the leading industrial nation on the face of the globe.

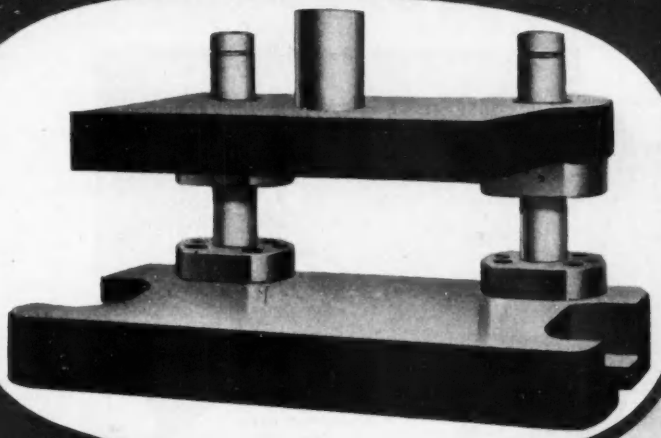
CLEAR WRITING FOR EASY READING, by *Norman G. Shidle*, published by *McGraw-Hill Book Co., Inc., 330 West 42nd Street, New York 18, N. Y.* Price $3.00. This book describes and teaches the application of a specific method for writing reports, letters, memoranda, articles, or any kind of writing which attempts to explain, sell, or influence its readers. It presents numerous samples drawn from actual business, professional, and social experience.

QUALITY-CONTROL HANDBOOK, edited by *J. M. Juran*, published by *McGraw-Hill Book Co., Inc., 330 West 42nd Street, New York 18, N. Y.* Price $10.00. The 15 sections of this book cover the economics of quality control; how to organize for quality; acceptance, control, and assurance of quality; and the application of quality control to specific processes and products, such as aircraft.

BAUMBACH DIE SETS

COMPLETE **40 YEARS** OF SERVICE

TO THE STAMPING INDUSTRY



Thank You... Men of the Industry

For your continued use of Baumbach's precision die sets.

We appreciate the opportunity to serve such an important industry with the tools they need to make better products at lower cost.

Because of your acceptance of Baumbach products, we have grown from a modest beginning to the largest exclusive die set manufacturer in the world.

Today Baumbach die sets are available from local stocks in 25 major stamping centers from coast to coast.

Our new catalog showing hundreds of sizes and styles of die sets, plus a complete line of stamping accessories is now ready. Write for your copy today.

E. A. BAUMBACH MFG. CO.

1818 SOUTH KILBOURN AVENUE • CHICAGO 23, ILLINOIS

Telephone CRawford 7-4041

METALS

(*Continued from page 49*)

the domestic price continued on the basis of 17 cents a pound New York, export quotations varied between 21½ and 22½ cents freight-aboard-ship Gulf ports. The net price realized by American Smelting & Refining Co. on all its sales of Mexican lead was 21.2 cents per pound f.o.b. Mexican refinery. Canadian producers want 20 cents delivered in the United States. Suspension of the duty of 1 1/16 cents a pound is expected but is unlikely to bring in any more metal to this country. A serious shortage of trained miners in virtually every mining district has halted any hope for increased domestic output.

Reduced Zinc Sales Likely

The zinc situation is little better than lead but there is some belief that the copper shortage will force a slowdown by the brass fabricators who may consequently curtail their purchases of zinc until sufficient copper is supplied to continue their operations. It is also possible that less automobile production may cause a reduction in demand for high grade zinc for diecasting. Certainly if aluminum were in better supply some substitution for zinc would be witnessed in the industry.

The supply situation continues very tight. The strike caused a loss of 15,000 tons in new production and the government has waived deliveries of zinc temporarily to the stockpile. This will afford upwards of 3000 tons a month of additional metal to industry.

Export prices for zinc are far higher than the domestic ceiling and are quoted at 29 cents a pound and upward. Some Mexican zinc has been sold in Europe as high as 42 cents.

Aluminum Surplus Possible

The Government's concern over an aluminum shortage appears unjustified in view of the ambitious expansion in production that is moving on schedule and the excellent progress that has already been witnessed in increased output this year. Contrasting sharply with copper output, primary aluminum production thus far in 1951 is now estimated at the rate of more than 870,000 tons a year compared with 720,000 tons in 1950, an indicated increase of over 20 per cent. July production alone was 72,700 tons, about eight per cent more than June. At this rate there should be no difficulty in reaching the goal of 1,300,000 tons set for June, 1952. By 1953 the country should count on over 1,440,000 tons of domestic output. This makes no allowance for the huge increase scheduled by Aluminum Co. of Canada, a large portion of which will be seeking a market in the Uinted States.

In spite of these figures which have raised some concern with metal statisticians as to disposal of so large a tonnage under a peacetime economy, the government continues to withdraw about 12,000 to 15,000 tons a month from new production for the stockpile, and at the same time drastically curtails the tonnage that is allowed for non-defense consumption. With copper undeniably in scarcest supply and little hope that production can be measurably increased in the immediate future, substitution of aluminum for copper wherever possible would appear to be a logical step. This has been urged by some government authorities without, however, indicating where industry is to get the aluminum under present restrictions.

An aluminum surplus in 1952 is entirely possible. Normal consumption of primary aluminum in the United States has averaged 617,000 tons a year in the four years 1946-49. Normal peacetime use in 1952-53, using the 1949 per capita rate and allowing for population increase, would be about 775,000 tons. At the indicated production rate, this would permit an exportable surplus of some 600,000 tons after providing for industrial demands.

(*Turn to page 116, please*)

LOWER THE BOOM ON COSTS

SET RIVETS FAST

2 at a time with the Chicago "214"

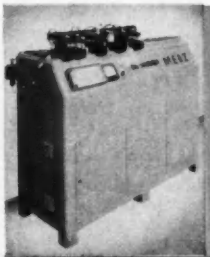
• With every press on the foot pedal the Model 214 Chicago Double Rivet Setter automatically feeds, inserts and clinches *two* rivets. 14-inch throat accommodates large assemblies. Handles 9/64" or smaller steel tubular rivets, ¾" or less in length. Quick Change Rotary Type Hoppers and Raceways permit a 5-minute changeover to rivets of different size. Adjustable anvils and riveting centers add to its versatility. For help with your specific fastening problem...send a sample of your problem assembly (or a blue print) for free fastening analysis.

FREE CATALOG contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

Chicago Rivet & MACHINE CO.

9612 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois

Branch Factory: Tyrone, Pa.



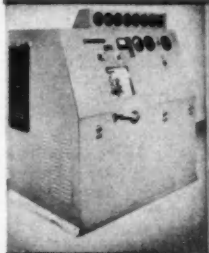
For gaging and sorting tappets at the rate of 3600 parts per hour.

Electronic Gaging & Sorting Machine

Standard A.G.D. & Special Gages

gages

PRODUCTION · PRECISION · ENGINEERING



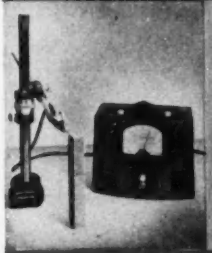
Machine checks servo unit for Automatic Transmission.

Hydraulic Test Machine

For a quarter of a century the MERZ Organization has been engineering the tools and gages demanded by the Automotive Industries to maintain its high standards of precision and production.

Shown here are a few of the Measuring and Sorting Machines currently being furnished by MERZ to the Automotive Industries. Also, the MERZ line of Exactitude A.G.D. gages has been accepted as standard by the Industry.

Write MERZ for Catalog with additional information.



Model 8-10

Standard Electronic Height Gage Indicator

MERZ *Engineering Inc.*

200 S. HARDING
INDIANAPOLIS 7, INDIANA

Gage has indicating scales accurate to .00001 and .0001 of an inch.

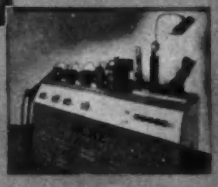
Model A-10 Electronic Comparator & Indicator

Hydraulic Final Test Machine
Machine tests Automatic Transmission under simulated actual driving conditions.

Engineered to provide a dependable and high magnification gage.

Model 60 Air Gage

Wrist Pin Gaging & Sorting Machine
Parts tested for hardness, finish, length, taper and roundness at the rate of 3600 per hour.



IMPORTANT

precision production

For more than 35 years The Pierce Governor Company, Inc. of Anderson, Indiana, has excelled in the design, engineering, and production of important parts for the Automotive and Aircraft industries. Today's production features:

Sisson Automatic Chokes

Complete line of precision engineered chokes for the automotive industry—original equipment and replacement parts

Famous Pierce Governors

Pierce centrifugal-mechanical and hydra-mechanical governors for gas, gasoline and Diesel engines—automotive and industrial.

Aircraft Engine Controls

Design and manufacture of precision hydraulic and mechanical fuel control systems for leading aircraft engines

Hydraulic Transmission Controls

Manufacture of control mechanisms for hydraulic transmissions

Let Pierce's precision engineered products and manufacturing facilities solve *your problem!* Write . . .

The Pierce Governor Co., Inc.
Anderson, Indiana

PIERCE GOVERNORS

METALS

(*Continued from page* 114)

Tin Prices May Advance

Tin alone among the important metals is selling today substantially below its peak price since the outbreak of the Korean war. In June, 1950, spot tin was quoted at 77.6 cents a pound on the New York Commodity Exchange. Scare buying by consumers who feared Communist attacks would interfere with Malayan production, along with yeoman aid by speculators on the London and Singapore Exchanges, drove the price to $1.85 by February. At that time RFC declared war on the tin producers as being ruthless profiteers, and started an all-out attack on the tin price. Under ceaseless hammering RFC succeeded in bringing the price down to $1.03 where it has remained since August 1.

Recently it appears that RFC may adopt a more conciliatory attitude and the chances look better than even that future tin prices will advance rather than decline. The tip-off came when RFC agreed to pay Bolivian producers $1.12 a pound while still maintaining $1.03 for the Malayan mines. More recently the agency has agreed to investigate mining costs in the Far East to determine what is a fair price to pay.

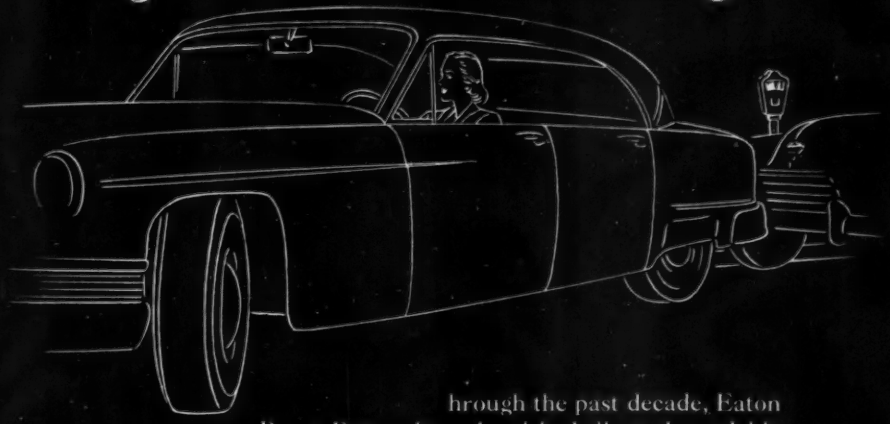
As a result of the concession to Bolivia the tin price strengthened in both London and Singapore. Selling in London at the equivalent of $1.05 a pound in August, it leaped to $1.32 and has since stayed substantially above the RFC selling price to domestic buyers. In this country consumers have shown more interest and bought more freely. Any final breakdown in the Korean truce negotiations might set off another buying movement. We should prefer not to be short of tin at $1.03.

BOOKS . . .

PRACTICAL ELECTRICITY AND MAGNETISM, by *Maurice Rubin*, published by *Chemical Publishing Co., Inc., 212 Fifth Avenue, New York 10, N. Y.* Price $7.50. Beginning with the basic concept of electricity and magnetism, the book progressively proceeds to the more advanced aspects such as electrical meters and measurements, magnetic measurements, and photoelectric, thermionic and electronic phenomena.

WELDING PRINCIPLES FOR ENGINEERS, by *Joe Lawrence Morris*, published by *Prentice-Hall, Inc., 70 Fifth Avenue, New York 11, N. Y.* Price $7.00. The book gives a modern and complete treatment of welding from the standpoint of what the engineer needs to know about the process. It covers metal spraying, flame hardening, stud welding, flux cutting, brazing welding and many other new processes.

-and now Hydraulic Steering!



hrough the past decade, Eaton Rotor Pumps have furnished silent, dependable hydraulic power for such motor car refinements as automatic transmissions, convertible top lifts, and window lifts, as well as pressure for engine lubrication. Now, hydraulic steering is added to this list as the newest contribution of Eaton Rotor Pumps to the ease, convenience, and safety of modern motoring. Eaton's experience as the sole supplier of pumps for hydraulic steering on motor cars is at the disposal of vehicle manufacturers.

EATON ROTOR PUMPS

EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

Pump Division

9771 French Road · Detroit 13, Michigan

Renegotiation Needs Salesmanship

(*Continued from page 48*)

1. Efficiency of the contractor with particular regard to attainment of quantity and quality production, reduction of costs and economy in the use of materials, facilities and manpower.

2. Reasonableness of costs and profits, with particular regard to volume of production, normal earnings and comparison of war and peacetime products.

3. Reasonableness of return on net worth with particular regard to the amount and source of public and private capital employed.

4. Extent of risk assumed, including the risk incident to reasonable pricing policies.

5. Nature and extent of contribution to the Defense effort, including inventive and development contribution and cooperation with the Government and other contractors in supplying technical assistance.

6. Character of business, including source and nature of materials, complexity of manufacturing techniques, character and extent of sub-contracting and rates of turnover.

7. Such other factors as the consideration of the public interest and fair equitable dealings may require, which factors shall be published in the regulations of the board from time to time as adopted.

The final report should be superb, skillfully written document bringing to the board's attention all the company's National Defense efforts. This report will be given serious consideration and all statements will be analyzed.

The Comptroller has done his job well in preparing various statistical analyses, following through on analysis of sales and allocating costs. He has prepared comments on various items and drawn conclusions and interpreted the figures.

Presentation of the Report

The Sales Manager, Advertising Manager and Public Relations Director who are daily preparing written material to sell the company's products against heavy competition are the type of men who can write an outstanding statement on the activities of the company for the past year. The report should have the benefit of all the officers thinking on each section. It is important to secure every constructive criticism tending toward an improvement in its compensation. Remember the Renegotiation Board may perform a major operation on profits of the company.

The report should be prepared on a very high editorial plane and be supported by accounting schedules, pricing information, trade magazine advertising, catalog material, and evidence to support the statements in the report as to the Defense efforts of the company.

The company has had a good year, profits are excellent, a superior report has been presented. Now who should attend the meeting with the Renegotiation Board? It is recommended that the oral presentation be made by the Sales Manager or Public Relations Director. The Treasurer or Comptroller should be there ready to satisfy the panel on any figures or facts in the report which may be questioned and require an authoritative answer. The temperament of factual men is seldom conducive to an eloquent oral presentation.

Management by means of the report they submit should prove that the profits of the company are not excessive. It must be clearly demonstrated that the profits are efficient dollars and any amount reclaimed would penalize an efficient operator.

The Government is only after excessive profits on business having a National Defense end use. Any contractor who admits he has such profits—well he should refund the amount to the Government. Companies having efficient profits need a superior type of report which most corporate officers do not have time to prepare.

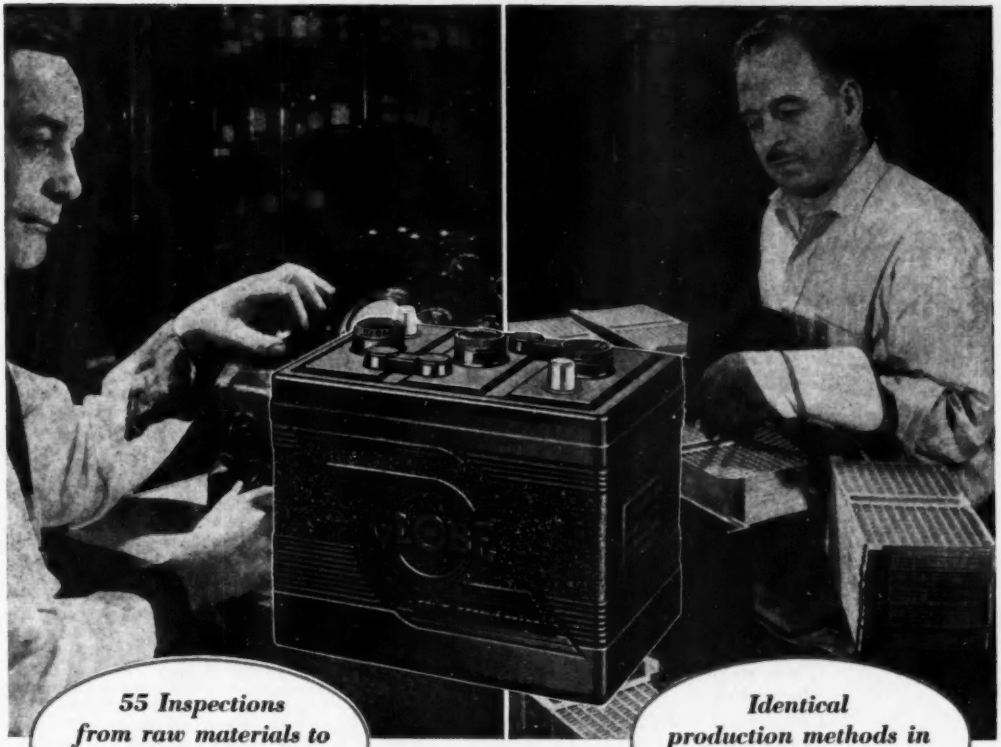
JOHNSON
Tappets
are made by Tappet Specialists
Thorough and complete attention by the entire Johnson Tappet organization to these important working parts of your engines assure you of maximum tappet life and performance.
SELF LOCKING TAPPET SCREW
Originated by Johnson this diaphragm type Self Locking Tappet Screw is operating successfully in millions of cast iron and steel tappets.

"Tappets Are Our Business"

JOHNSON JP PRODUCTS INC.

MUSKEGON, MICHIGAN

THE ENGINEERED BATTERY



55 Inspections from raw materials to finished product

Identical production methods in all 13 factories

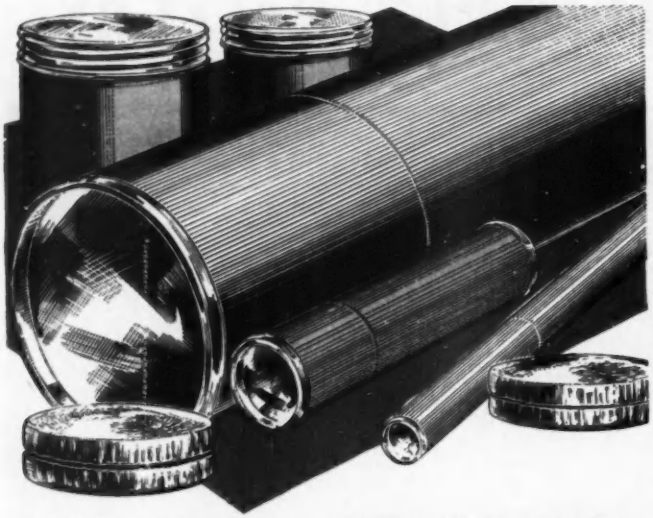
DEPENDABLY UNIFORM IN QUALITY AND PERFORMANCE

SURE, it's easy to build a battery! All you need is a box with some lead plates and an acid solution. Take it from there, however, and build millions of units in 13 different factories, and have all like units absolutely identical in quality and performance . . . that's something else again! Then you've really got something! Then you have a Globe-Union built battery. You also have an example of engineering at its finest...of research, development and production on an unprecedented scale, of infinite insistence on perfection at every stage of design, manufacture, assembly and inspection. Significant of the engineered precision with which a Globe battery is built are the 55 inspections through which every unit must pass from raw materials to finished product. That's a lot of inspections. But it produces the uniformly dependable "spinning power", split-second starting, and lasting quality for which Globe-Union built batteries are known around the world.

SPINNING POWER
GLOBE-UNION
SPLIT-SECOND STARTING

GLOBE-UNION, INC., Milwaukee 1, Wisconsin

Atlanta, Ga. • Boston, Mass. • Cincinnati, Ohio • Dallas, Texas • Emporia, Kans. • Hastings-on-Hudson, N. Y. • Los Angeles, Calif. • Memphis, Tenn. Mineral Ridge, Ohio • Oregon City, Ore. • Philadelphia, Pa. • Reidsville, N. C.



CLEVELAND CONTAINERS

Reduce Loss or Damage to Parts in Transit

★

. . . Faster assembling with less effort . . . more units per container.

. . . Save steps and time in production and forwarding.

CLEVELAND CONTAINERS have unusual STRENGTH and RIGIDITY.

REDUCE COSTS in thousands of plants.

★

We DESIGN and DELIVER quickly the TYPES of CONTAINERS that will meet YOUR individual needs and enable you to maintain schedules.

★

Ask, also, about our PLUGS, SLEEVES and CAPS to protect threads and parts against damage.

★

Samples gladly furnished

The CLEVELAND CONTAINER Co.
6201 BARBERTON AVE. CLEVELAND 2, OHIO
• All-Fibre Cans • Combination Metal and Paper Cans
• Spirally Wound Tubes and Cores for all Purposes
★ ★ ★
PLANTS AND SALES OFFICES: Cleveland, Detroit, Chicago, Plymouth, Wisc., Jamesburg, N. J., Ogdensburg, N. Y. • ABRASIVE DIVISION at Cleveland
SALES OFFICES: Grand Central Terminal Bldg., New York City; Washington Gas Light Bldg., Washington, D. C.; West Hartford, Conn.; Rochester, N. Y.
Cleveland Container Canada, Ltd., Prescott, Ontario • Offices in Toronto and Montreal

Ford Automatic Transmission

(*Continued from page* 38)

Finish-grinding of diameters is done in a Landis Type HIW multiple-wheel grinder while the gear face and recess on the long and short sides are finish-ground in a Landis 6 by 18 angular wheel slide machine arranged for automatic cycling and sizing.

The big ring gear is presented in the rough as a doughnut-shaped forging of SAE 5140 steel. It is finished all over, and has a 66-tooth internal helical gear as well as 59 external teeth.

The first operation on this part is complete blanking in a New Britain-Gridley eight-station, automatic chucking machine having double index. Next the part is presented to an Ex-Cell-O Model 112C single-end, two-spindle precision-boring machine for finish-turning and finish-boring operations. Finish-turning of the OD to close limits—5.9975-5.9960 in.—is of great importance because a closely fitting diaphragm chuck is used in the Fellows gear shaper. The 66-tooth internal helical gear then is cut in the special No. 10, ten-station Fellows rotary gear shaper which is equipped with the Barnesdril magnetic chip separator. Gear teeth are chamfered and deburred in a Sheffield spline burring machine.

The internal gear then is straight-shaved in a Model GCI-12-in. Red Ring rotary gear finisher, the work being hand loaded. This shaver is fitted with a special air-operated diaphragm chuck to hold the work accurately in the same manner as for gear shaping.

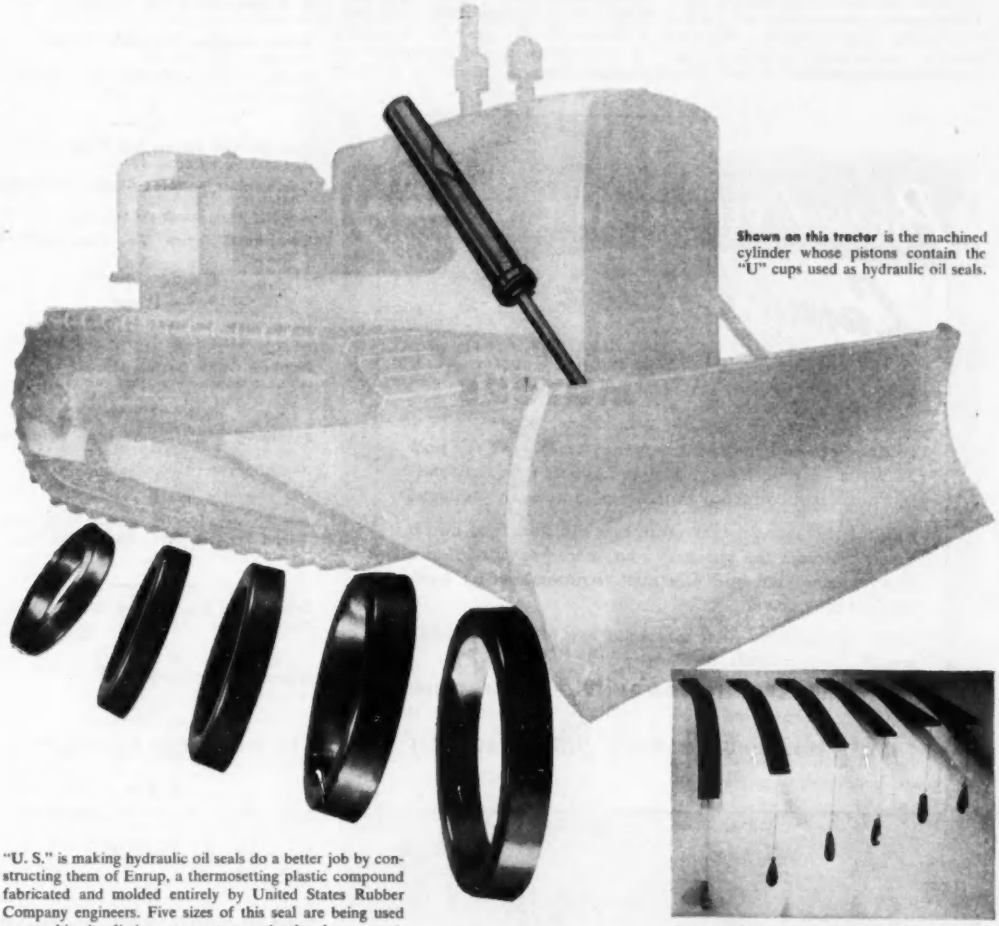
External teeth are cut in the familiar Michigan Tool Model 1873 heavy duty Shear-Speed gear shaper. For this operation the gears are loaded two blanks at a time (back to back), clamped on a splined draw bar and secured by a hydraulically-operated draw bar. Following this the teeth are deburred and chamfered in a Sheffeld two-station machine.

Heat treating is done in Surface Combustion rotary type furances, providing a light case 0.005-0.012 in. deep. The parts are oil-quenched in Gleason presses to preserve dimensional accuracy, then drawn to Rc 58-63 in a Holcroft furnace. Final inspection completes the operation.

Although quality control varies in extent and intensity depending upon the complexity of the part, there is a general pattern of procedure designed to hold quality at high levels. On gear jobs in particular, it is the responsibility of the operator to make a percentage or sampling inspection for size and PD runout on a hand rolling fixture, as well as a visual check for machining defects. Moreover, the machined blank is inspected before any gear cutting is

(*Turn to page* 126, *please*)

What's U. S. Rubber doing with hydraulic oil seals?



Shown on this tractor is the machined cylinder whose pistons contain the "U" cups used as hydraulic oil seals.

"U. S." is making hydraulic oil seals do a better job by constructing them of Enrup, a thermosetting plastic compound fabricated and molded entirely by United States Rubber Company engineers. Five sizes of this seal are being used on machined cylinders on tractors and other heavy road-building equipment. These seals last much, much longer than the seals previously used.

Enrup has unusual abrasive resistance, can be molded to close tolerances, and can be machined. It has high impact strength and great toughness. It is especially valuable on heavy-duty lathes, household appliances, plating barrels, and dozens of other applications. You may find that Enrup is just what you have been seeking to improve your product. Write to address below.

These are the "U" cups made of Enrup, used as a hydraulic oil seal on tractors and other heavy road-building equipment.

Between the extreme elasticity of soft rubber (the strip at the extreme left) and the rigidity of hard rubber (strip at extreme right) are 4 strips of Enrup. Note varying degrees of flexibility, making Enrup a true bridge between hard and soft rubber.

PRODUCT OF U.S. RUBBER SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

New Defense Facilities

SUPPLEMENTING the list of Certificates of Necessity issued up to August 18 authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which were published in the September 15 issue, page 150, of AUTOMOTIVE INDUSTRIES, the following additional certificates were announced by the Defense Production Administration. These are the first cases acted on since the general moratorium was imposed August 18.

Included in this latest tabulation, 3552 new or expanded defense facilities of all types have been authorized for rapid tax write-off, the total amount eligible for amortization being $9,592,386,181. These figures are exclusive of cases that are up for later review but included in this list — in these cases no dollar amount is listed. The figure appearing in parenthesis is the percentage authorized for actual fast tax write-off.

— A —

Advance Screw Products, Rosemont, Cal.
Aircraft parts—(90)

Aerojet Eng. Corp., Azusa, Calif.
Aircraft—(75)

Air Associates, Inc., Teterboro, N. J.
Aircraft parts—(85)

Automotive Specialty, Brooklyn, N. Y.
Military items—(75)

— B —

A. E. Bausenbach, Inc., Buffalo, N. Y.
Aircraft parts—(85)

Boeing Airplane Co., Seattle, Wash.
Aircraft—$237,249 (75)

The Bridgewater Machine Co., Akron, O.
Aircraft parts—$487,500 (80)

— C —

Consolidated Vultee, San Diego, Calif.
Engineering services—$2,658,000 (75)

Continental Motors Corp., Muskegon, Mich.
Aircraft engines—$1,421,146 (75)

Continental Screw Co., New Bedford, Mass.
Aircraft parts—(80)

— D —

Dana Corp., Fort Wayne, Ind.
Aircraft—$5,460,000 (75)

Dealcam Corp., Boston, Mass.
Aircraft instruments—$846,702 (80)

— E —

Engelberg Huller Co., Inc., Syracuse, N. Y.
Aircraft parts—(80)

— F —

The Firestone Tire & Rubber Co., Industrial Products Div., Noblesville, Ind.
Tank tracks—(75)

— G —

Grimes Mfg. Co., Urbana, Ohio
Aircraft lights—(80)

— H —

Haber Corp., Chicago, Ill.
Aircraft parts—(85)

— I —

I-T-E Circuit Breaker Co., Phila., Pa.
Engine parts—$924,340 (75)

— K —

Kaiser Metal Products, Inc., Bristol, Pa.
Aircraft—$4,898,900 (75)

Kehrig Mfg. Co., Utica, Mich.
Tank kits—(75)

— L —

Lockheed Aircraft Service, Inc., Burbank, Calif.
Aircraft maintenance—$125,499 (75)

— M —

McDonnell Aircraft Corp., St. Louis, Mo.
Airplanes—$9,589,222 (70)
3,500,000 (75)
1,000,000 (80)

McDonnell Aircraft Corp., Robertson, Mo.
Airplanes—$2,350,781 (75)
1,323,859 (85)

Miesel Press Mfg. Co., Boston, Mass.
Aircraft engine parts—(85)

(*Turn to page* 124, *please*)

Proved PERFORMANCE

Lamb Electric

SPECIAL APPLICATION
FRACTIONAL HORSEPOWER
MOTORS

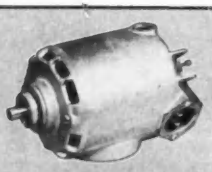
During normal times and emergency times — for the past 36 years — Lamb Electric Motors have had an outstanding performance record in many motor-driven products.

Behind this good performance is the fact that Lamb Electric Motors are *specially engineered* to provide the exact mechanical and electrical requirements for each product they drive.

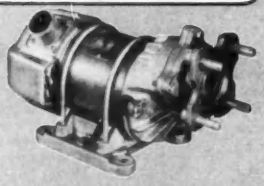
Other advantages often obtained are reduced *product* weight, compactness, and lower cost.

THE LAMB ELECTRIC COMPANY • KENT, OHIO

THEY'RE POWERING AMERICA'S *Finest* PRODUCTS



Having inbuilt control switch and receptacle, this motor is readily adaptable to portable tools and equipment.



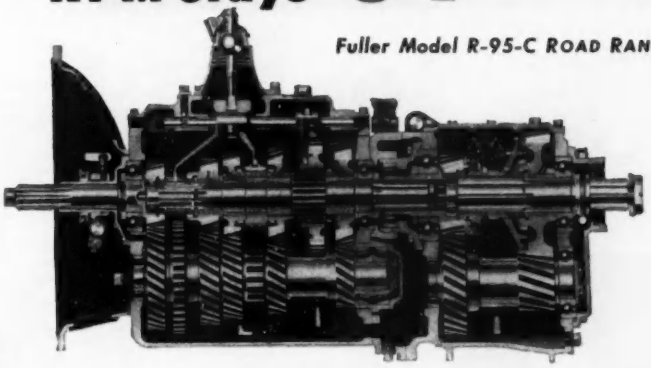
High powered lightweight helical geared fuel transfer pump motor for aircraft and other services.

Lamb Electric

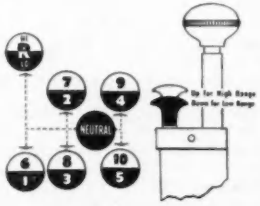
SPECIAL APPLICATION
FRACTIONAL HORSEPOWER
MOTORS

Your TRIP Costs go DOWN when RPM stays UP

Fuller Model R-95-C ROAD RANGER



FULLER ROAD RANGER®



With a new Fuller ROAD RANGER Transmission in your rig, you can pull the same load *faster* with *less fuel*, or a bigger load with the same amount of fuel.

One look at the shift diagram above for the Model R-95-C shows you why. ROAD RANGERS actually are two-range transmissions, with five speeds in each range and a synchronized power shift between ranges.

Speeds are spaced so that every ratio is a usable ratio in 28% steps that are equal, selective and progressive.

Your driver finds it easy to use his head more, his "foot" less . . . to keep his engine turning in the maximum economy range by quick, easy shifts—with minimum rpm loss in engine speed to match road and load conditions . . . to get there faster with 1/3 fewer shifts.

It's as simple as that . . . you keep engine rpm up—and you keep trip costs down by saving time, saving fuel, and relief of driver fatigue.

If you haven't seen a ROAD RANGER in operation yet, plan to do so at once. You'll see horsepower really put to work in the most efficient way possible.

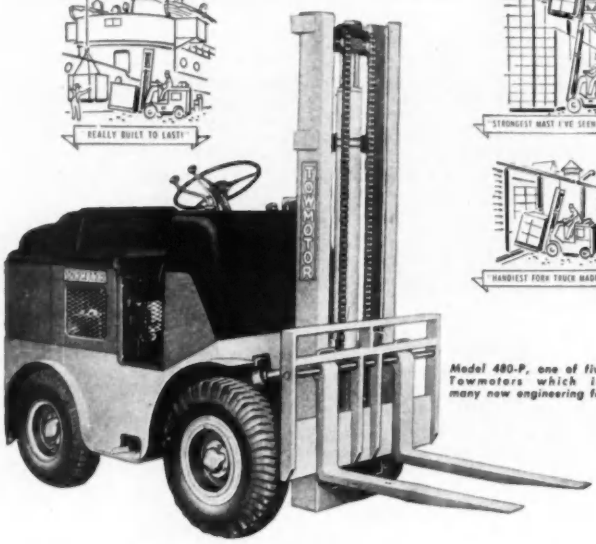
where horsepower goes to work

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

handling experts everywhere are talking about the

NEW TOWMOTORS!



Model 480-P, one of five New Towmotors which include many new engineering features.

No wonder the new TOWMOTORS are such a sensation just look at these features:

- Extra heavy duty frame
- Drop forge beam steering axle
- Functionally styled cowl
- Full vision instrument panel
- Precision controls in easy reach
- Super-strength forks
- Maximum free lift
- Engineered tire equipment
- Double universal joint
- Precision mast construction
- Maximum operating comfort
- Heavy duty hydraulic brakes
- One piece drive axle assembly
- Heavy, industrial-type engines

Get the facts—see the new Towmotor 15-minute film, "What Makes It Tick?"

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☐ Send me more information on the new Towmotor
☐ I'd like to see the new film, "What Makes It Tick?"

NAME_____
COMPANY_____
ADDRESS_____
CITY_____ STATE_____

HOW MANY PEOPLE HAVE YOU TALKED TO ABOUT AMERICANISM TODAY?

Defense Facilities

(*Continued from page* 122)

— N —

The National Automatic Products Co., Berlin, Conn.
Aircraft parts—(80)

The New York Air Brake Co., Watertown, N. Y.
Military items—$192,800 (75)

Niles-Bement-Pond Co., Warwick, R. I.
Fuel pumps, aircraft—$371,070 (75)

— P —

Parent Co., Los Angeles, Calif.
Aircraft parts—(90)

Pitney-Bowes, Inc., Stamford, Conn.
Aviation parts—$771,770 (75)

— R —

Rheem Mfg. Co., Downey, Calif.
Aircraft—$2,942,316 (75)

Ross Gear and Tool Co., Lafayette, Ind.
Steering gear—(80)

— S —

Sampson Motors, Inc., Los Angeles, Calif.
Aircraft parts—(80)

Statham Laboratories, Inc., Los Angeles, Calif.
Aircraft parts—(80)

The Steel Improvement & Forge Co., Cleveland, Ohio
Aircraft—$107,213 (85)

— T —

Thompson Products, Inc., Cleveland, Ohio
Military items—$149,970 (75)

Twin Coach Co., Buffalo, N. Y.
Aircraft parts—(80)

Twin Disc Clutch Co., Rockford, Ill.
Military items—$957,651 (80)

— V —

Vinco Corp., Detroit, Mich.
Aircraft parts—(80)

— W —

Whirlpool Corp., LaPorte, Ind.
Aircraft parts—$1,125,000 (75)

White-Rodgers Electric Co., St. Louis, Mo.
Aircraft parts—$4,876,800 (75)

Wilkening Mfg. Co., Phila., Pa.
Military items—$421,571 (80)

World Tool & Engr. Co., Minneapolis, Minn.
Aircraft parts—(80)

BOOKS . . . .

200 MILES UP—The Conquest of the Upper Air, by *J. Gordon Vaeth*, published by *The Ronald Press Co., 15 East 26th Street, New York 10, N. Y.* Price $4.50. An interesting factual account and explanation of modern scientific research on the nature of the atmosphere at altitudes beyond the present range of piloted flight. The book describes and explains with pictures and text the use of rockets, plastic balloons, and airborne instruments in exploring the frontiers of space.

PHYSICAL CHEMISTRY OF LUBRICATING OILS, by *A. Boudi*, published by *Reinhold Publishing Corp., 330 West 42nd Street, New York, N. Y.* Price $10.00. This volume gives the latest theories on lubricating oils and the physical and chemical principles underlying their action.

For Greater Endurance and Longer Life . . . . . .

DUREX-100 ENGINE BEARINGS

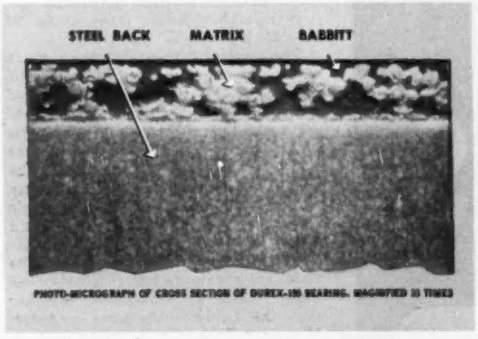


PHOTO-MICROGRAPH OF CROSS SECTION OF DUREX-100 BEARING. MAGNIFIED 33 TIMES

THE MATRIX MAKES THE DIFFERENCE

Steel-backed intermediate matrix of porous copper-nickel bonds mechanically and metallurgically with high-lead babbitt overlay to provide far greater embedability.

Know how Durex-100 bearings are built, and you know *why* they last longer in all kinds of service. Durex-100 bearings actually *absorb* particles of foreign matter . . . protect engine crankshafts to the limit.

In making Durex-100 bearings, the steel back is covered with a layer of metal powders that become a porous matrix integrally brazed to the steel back. A thin overlay of high-lead babbitt penetrates the matrix and bonds mechanically and metallurgically with it. Only Durex-100 bearings provide this protection that assures longer bearing life.

Durex-100 engine bearings are used as original equipment on Cadillac, Buick, Oldsmobile, GMC, and other leading makes of cars and trucks. Ask Moraine for the complete story on Durex-100 bearings. See how they can be used to advantage in the engines *you* manufacture.

MORAINE PRODUCTS
DIVISION OF **GENERAL MOTORS**
DAYTON, OHIO

Durex-100 Engine Bearings by Moraine

(*Continued from page* 120)

done. Similarly, after shaving, the operator makes a percentage check for size and runout and visually to duplicate the inspection after gear cutting.

In addition to the inspection by the operator, there is a bench inspection by the quality control group, both visual and of controlling dimensions, after machining, after gear cutting, after shaving, after grinding, as well as after in heat treating.

Superimposed on this broad control program is the activity of the gear laboratory. It is responsible for the inspection and acceptance of all gear cutting and gear shaving tools, checks each new setup before production runs are established, and approves all setups whenever tool changes are made. In addition, the gear laboratory makes sampling checks at intervals of production quality to make sure that control exists at all times. Moreover, gears are checked at the start of each shift.

The gear laboratory contains the latest type of equipment and instrumentation known to the art. Among the principal items are: Illinois helical lead checkers with chart attachment for checking lead and involute form; Fellows Red Liners with chart attachment for checking roll and concentricity; Michigan Tool Sine-Line lead checker for hobs; Red Ring sound checking machines for noise checking.

At the present time the gear department boasts a battery of six National Broach rotary gear shaving machines; four Cleveland rotary hobbing machines; three Cleveland single spindle hobbing machines; two Lee Bradner rotary hobbing machines; two National Broach internal gear shaving machines; two Michigan Tool Shear Speed gear shavers; two Fellows gear shapers; two Fellows gear rotary shapers Model 10; one Michigan Tool gear lapper; one Michigan Tool rotary gear shaving machine; one Fellows gear lapping machine.

British Aircraft

(*Continued from page* 44)

New Jet Bombers

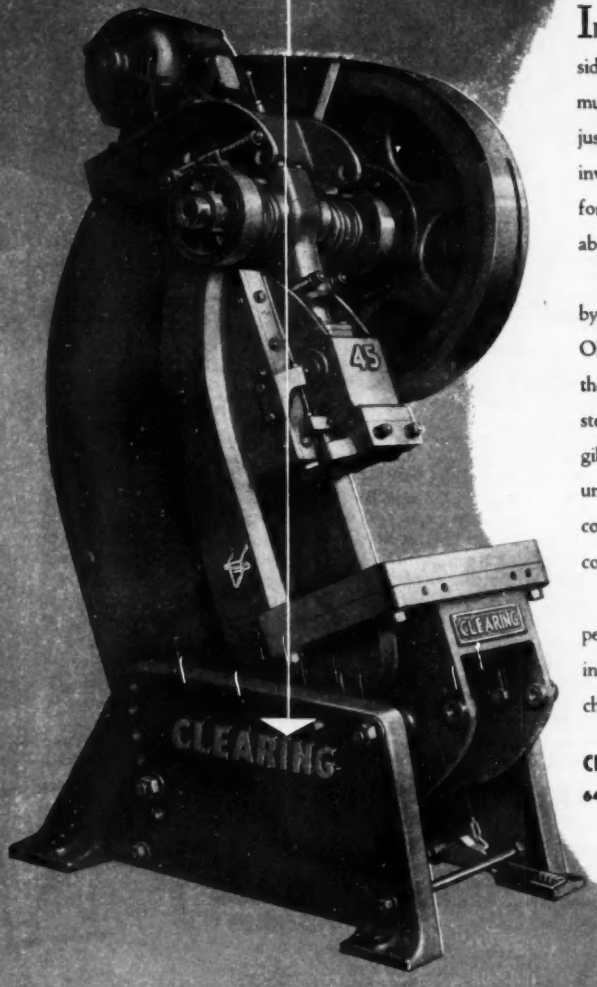
Special attention was given to the first two British four-engine jet bombers — the Vickers-Armstrong Valiant and the Short S.A./4. Both of these are at present on the secret list. The Valiant has four Rolls Royce Avon engines buried in the roots of the swept-back wing, each pair being fed from a common intake. It is claimed by the Air Ministry that the Valiant is superior to the twin-jet Canberra in range, speed, altitude and load-carrying capacity. This bomber was ordered straight off the drawing board by the British Air Ministry and was flown for the first time last May. The demonstration it gave appeared to justify the claim that it is the highest performance bomber of its class in the world.

The Short S.A./4 bomber, which made its maiden flight on August 10, was equally impressive. A feature of the engine mounting is the placing of the four Rolls Royce Avon turbo-jets superimposed in pairs in each of the massive wing mounted nacelles. The wing is not swept back, but is extremely thin. The nacelles are set at an angle to the fuselage center line and the tail plane has a pronounced diedhral angle in order to clear the jet gases. The main undercarriage has an eight-wheel bogey. These two machines, together with the Sapphire-Canberra undoubtedly place Britain in a strong position in the bomber field.

Blackburn & General represented the freighter class with the Universal Freighter prototype which flew for the first time last June. This has a load capacity of 15 tons, and is powered by four 2000 hp Bristol Hercules 261 piston engines. Its span is 162 ft, length 98 ft 4 in., and maximum speed 225 mph. It is designed for both military and civil heavy load carrying. Having an eight-wheel undercarriage, all wheels fitted with brakes, and re-

(*Turn to page* 130, *please*)

how to recognize a modern OBI press



IF YOU'RE among those who consider that OBI presses haven't changed much in 40 years—that a new one is just an old one without the wear—we invite you to examine the Clearing line for a pleasant and exceedingly profitable surprise.

You can recognize a modern OBI by the Clearing name on it. Clearing OBI presses are newly designed from the ground up. Every feature, from the steel weldment frame and extra long gibbing, to the quick acting clutch and unique connection design, has been incorporated because it makes a definite contribution to lower stamping costs.

You can't afford to meet future competition with anything less. Be sure to investigate Clearing before you purchase any OBI—from 30 tons upward.

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A set of 83 DoALL Gage Blocks with accessories *will make over 120,000 different snap gages for about 1/4 cent each.* Any one of these gages are made quickly. Just fit the blocks together with the necessary holders and you are ready for any measuring job—checking finished work, jigs and fixtures or other working or inspectors' gages.

DoALL Gage Blocks are *accurate to millionths of an inch.* They are ready when you want them—there is no loss of time or waste of good tool steel as when making your own gages.

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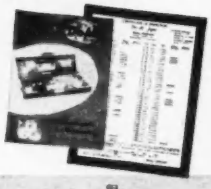
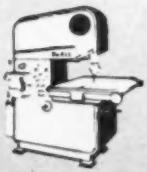
THIS BOOK will help you! MODERN MEASUREMENT CONTROL. Twenty pages describing DoALL Gage Blocks and accessories and how to use them. Ask, too, about DoALL Calibration Service for your present Gage Blocks. ➡



GB-4



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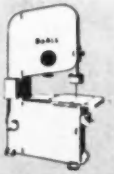
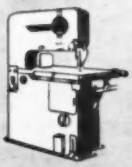


ZEPHYR



CONTOUR

BAND FILER

TOOLROOM GRINDER

CRUSH GRINDER

DoALL *Gage Blocks*

1. You get measurements in millionths of an inch!
2. You can "build" a gage in a matter of minutes!
3. You cut no metal — waste no material!

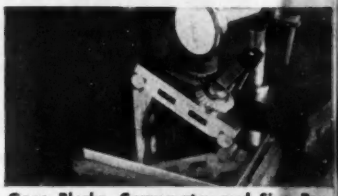
Checking your working gages — micrometers, calipers, snap gages, etc.

Go and no-go gages are quickly and inexpensively set up for checking parts.

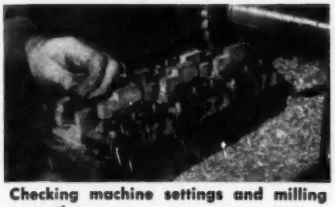
Height Gages for checking heights and bore diameters.

Scriber Point scribes straight lines with absolute accuracy.

Checking layout dimensions using Gage Blocks, Trammel Points and Holder.



Gage Blocks, Comparator and Sine Bar being used to check bevel gear.



Checking machine settings and milling operations.

Checking fixed gages and snap gages with DoALL Gage Blocks.

Gage Blocks combined to check an adjustable snap gage.

Take time pieces for example . . .

Westclox	Benrus Watch Company	U. S. Time Corp.
Elgin National Watch Co.	Bulova Watch Company	Telechron
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Gruen Watch Company		

These are producers of highest quality products whose basic manufacturing accuracy is controlled by DoALL Gage Blocks.

The list of DoALL Gage users is the roster of production achievement.

DoALL

Sales-Service Stores in All Principal Centers

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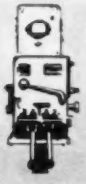
CARBIDE TOOL GRINDER

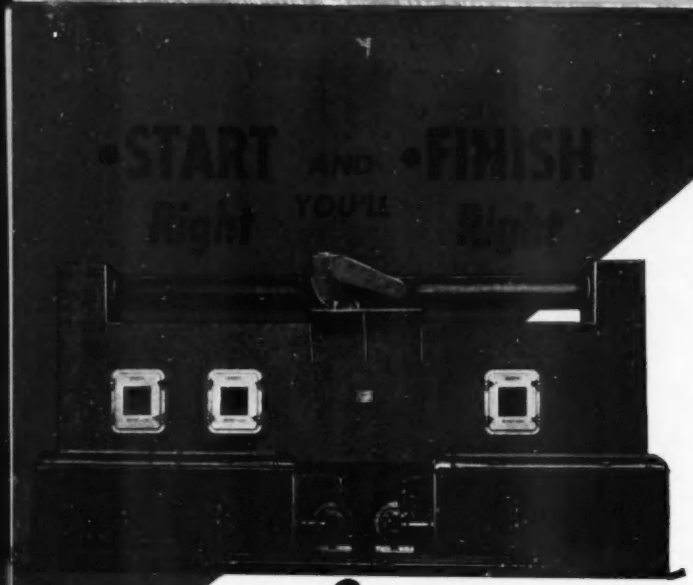
TOOLMAKER'S LATHE

SAW BANDS



BLADE WELDER

"See us at the METAL SHOW"
Detroit
OCTOBER 15-18
Booth H-305



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FIRST Step • FIRST Choice • In FINISHING

You start right when you call upon Schmieg engineers for mechanical washers to fit your specific production requirements. And that's why you finish right, too. Because Schmieg washers are designed and engineered to give you high production cleaning, long trouble-free performance at low operating cost.

There's a Schmieg washer for any kind of job, a washer that will save floor space and can probably be loaded and unloaded by one man. Available in manual and automatically loaded types.

Convenience is emphasized in Schmieg washers, no matter what type—convenient controls, variable speed drives, doors that permit quick access to interiors for ease of maintenance.

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THE best AIR PURGE is CENTRI MERGE

Schmieg INDUSTRIES INC.
Engineers & Manufacturers

[illegible] • DETROIT 2, MICHIGAN

British Aircraft

(*Continued from page* 126)

versible propellers, this machine landed, came to a complete stop and reversed in about 150 yd.

Some very impressive displays were made by the high speed fighters. The P 1067, built by Hawker Aircraft Limited, is reported to be faster in level flight than the North American F-86 or the Russian MIG-15, and made its first flights this year. An RAF production order was given long before the prototype had made its first flight. This single-seater fighter is equipped with one Rolls Royce Avon jet engine. During the exhibition it was unofficially timed at 670.9 mph.

The Swift, built by Vickers Armstrong Limited, took the air for the first time this year and is the first swept-back wing jet fighter to go into production for the RAF. It is powered by one Rolls Royce Avon turbo-jet engine and is a development of the Rolls Royce Nene-powered Vickers 510 and 535, the main external difference being that the wing tips are distinctly rounded at the leading edge. The air intakes appear to be larger.

The Vickers Supermarine 508, which flew for the first time in August, is claimed to be the world's fastest and most powerful naval fighter. It has two Rolls Royce Avon turbo-jet engines. Unlike the Swift, its wings are not back-swept, and it is equipped with what is known as a butterfly tail, having a pronounced diedhral to give a clean passage for the jet gases.

Three Delta-wing research aircraft were shown, two of these being seen in public for the first time. These were one of the Avro 707 types, and the other the Boulton Paul P.111. The two Avros, 707B and 707A, are prototypes which first flew in September of last year, both types being fitted with the Rolls Royce Derwent turbojet engine. The 707A differs from the other version by having air intakes on the leading edge of the wing instead of on the top of the rear fuselage, and first flew this summer. Both types are fitted with an 8 ft tail parachute for use as a landing brake. Dimensions are 34 ft 2 in. span and 42 ft 9 in. length for the 707A, and 33 ft span and 41 ft 10½ in. length for the 707B.

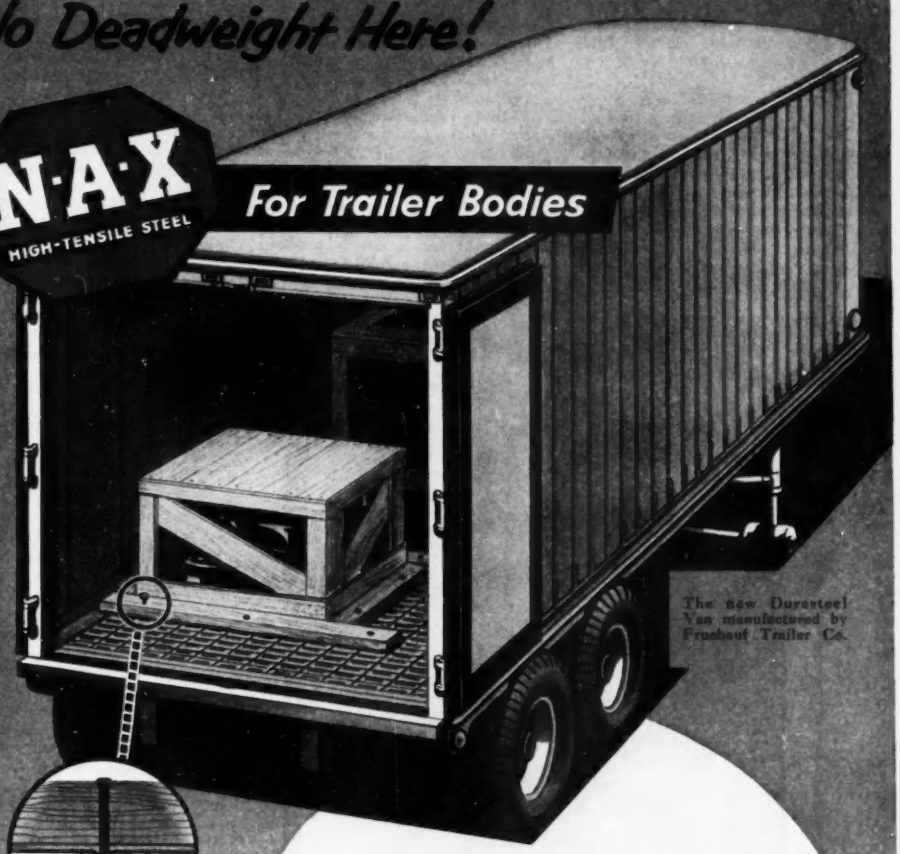
Fairey Research Plane

The Boulton Paul P.111, powered by a Rolls Royce Nene, has a fuselage of unusual width at the forward end, where, in the extreme nose, the oval shaped inlet is positioned. A fourth Delta-wing experimental machine is the Fairey FD 1, which will shortly carry out its first flights. This is the smallest aircraft in Great Britain, with a span of only 19 ft 6½ in., and is stated by the makers to have been designed for "im-

No Deadweight Here!

N-A-X HIGH-TENSILE STEEL

For Trailer Bodies



The new Duraisteel Van manufactured by Fruehauf Trailer Co.

*Great Lakes Stran-Steel Flooring has high strength and light weight. Its patented nailability permits safe blocking of loads. You distort the nail . . . not the floor.

America's first all-steel trailer body is on the highways—roof, sides, framing and flooring,* all of N-A-X HIGH-TENSILE steel. Years of planning, testing and research went into this unique trailer body, making it the most serviceable ever built.

1. The use of N-A-X HIGH-TENSILE steel in this equipment results in light weight with strength and durability.
2. In addition to greater strength, N-A-X HIGH-TENSILE steel has greater resistance to fatigue, impact, corrosion and abrasion. It offers a greater strength-to-weight ratio with longer life and larger payloads.

More and more of America's highway equipment manufacturers are swinging to N-A-X HIGH-TENSILE steel. Millions of on-the-job miles have proved the superior qualities of this steel . . . have proved its over-all economy.

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portant research work with revolutionary possibilities in the design and operation of fighter aircraft." It is believed that the prominent tail fairings are designed to house rockets which would supplement the Rolls Royce Derwent turbojet.

A touch of reality was added by the Gloster Meteor when it took the air with 24 rockets under its wings and red-painted wing tip tanks. This single-seat ground attack jet fighter is a private-venture prototype which first flew in August of this year. It has two Rolls Royce Derwent engines, and in addition to its rocket projectiles it carries four 20 mm. guns. Span is 37 ft 2 in., and length 44 ft 7 in. Despite its heavy load it carried out spins and vertical climbs in a most remarkable manner.

Other impressive flights by these fast machines were carried out by the Havilland Sea Venom, with Ghost turbojet giving 5000 lb thrust, which is now in regular production for the Royal Navy; the same firm's Vampire night trainer and a similar machine with Ghost engine having "reheat." Armstrong Whitworth demonstrated the Meteor N. F. 11 twin-jet two-seat radar equipped night fighter, which first flew last summer and is now in production for Fighter Command R. A. F. This has two Rolls Royce turbojet engines. Span is 43 ft and length 48 ft 6 in.

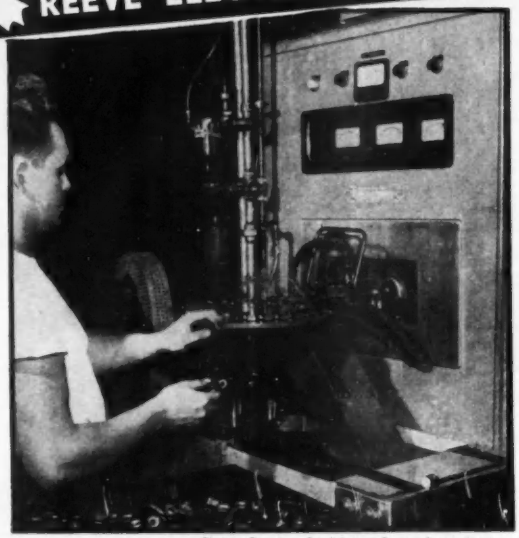
In the static exhibition Bristol showed models of the "Britannia" long-range airliner which should be in commercial service at the end of 1953. This Type 175 is in production for the British Overseas Airways Corporation and is powered by four Bristol Proteus propeller turbine engines. This ship has an all-up weight of 140,000 pounds and carries a payload of 25,000 lb over a distance of 4000 miles in still air at a mean cruising speed of 360 mph. The method of seat attachment makes possible a large variety of seating arrangements. For long distance oceanic flights 50 passengers can be accommodated, or 100 on shorter stages. The undercarriage is the four-wheel bogey type, all wheels being fitted with brakes, and propellers are reversible.

Saunders-Roe did not show the Princess 140 ton flying, the first of which is due to be launched at the end of this year, but had a mock-up of the 130,000 lb Duchess boat to carry 74 passengers and 3500 lb of freight over stages between 1300 and 2000 miles. This is powered by six De Havilland Ghost jet turbines buried in the leading edge of the swept-back wing. Span is 135 ft 6 in. and length 124 ft 6 in. Its maximum range in still air will be 3100 miles.

Every possible type of aeronautical equipment was to be found on the two hundred odd stands in the static exhibition, giving evidence of the vigorous growth of the British industry as a whole. The Ministry of Supply had an exhibition of unusual interest, showing among other things an experimental bi-fuel rocket designed and constructed as a general purpose test vehicle for investigating the numerous problems in aerodynamics, propulsion, structures, etc., which arise in supersonic flights. The H. F. suppressed aerial system for aircraft was designed to suppress external aerials so as to preserve the aerodynamic smoothness essential for high-speed flights. The exhibit showed the arrangements for energizing the wings and fuselage of aircraft for communications purposes in the 2-20 mc/s band and demonstrated the remote control system for tuning and matching the circuits for any of twelve preselected operating frequencies. Transonic research technique and Telemetering transducers were shown.

Plastic wings for high speed aircraft were exhibited. Molded to shape and reinforced at places of high stress, these high-strength plastic structures can be manufactured quickly and cheaply with comparatively simple tools and can be polished to a high degree of smoothness. As molded the material is quite porous, but can be made impervious to fuels by flushing with certain compounds, thus making integral fuel tanks a practical proposition. The National Gas Turbine Establishment revealed its experiments in combustion in gas turbines at high altitude.

SHOW TIME IS
A GOOD TIME TO INVESTIGATE
REEVE ELECTRONICS



Photo—Courtesy Studebaker Corp., South Bend, Ind.

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If your production calls for heat treatment of parts or assemblies . . . if you must solder or braze metals in production quantities, Induction Heating properly applied may be the *quick inexpensive solution.*

Reevelec equipment leads the industry in accuracy, precision control and efficient tooling. We shall be happy to discuss your problems with you. Write, call or wire. No obligation.

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The value of this service to the industry is proved by the fact that new customers are added to AC's list every year—and the old ones come back for more.

It might prove profitable for you to investigate AC as a source of supply. Please address your inquiries to any of the three offices listed on this page.

- ADAPTERS (Drive)
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- AMMETERS
- BREATHERS (Crankcase)
- CAPS (Radiator Pressure)
- DIE CASTINGS (Zinc)
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- GAUGES—AIR (Pressure)
- GAUGES—GASOLINE
- GAUGES—OIL (Pressure)
- GAUGES—TEMPERATURE (Water, Oil)
- OIL FILTERS (Lube)
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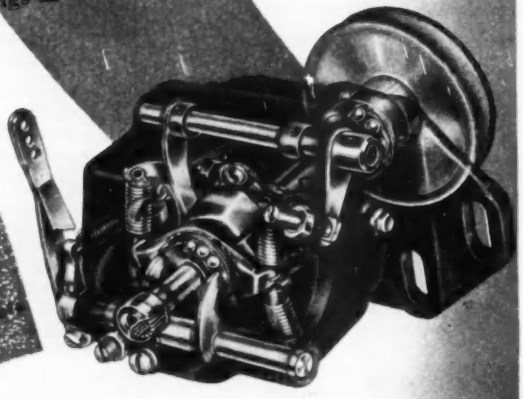
Ball and roller bearings at *all* load points keep friction at a minimum and make for both long life and continued accuracy in operation.

Oil seals are used throughout and housing has large oil capacity. Daily or frequent oilings are not required.



Write for Bulletin No. 704 for complete details

HOOF PRODUCTS CO.
6543 SOUTH LARAMIE AVENUE CHICAGO 38, ILLINOIS

Sports Cars

(*Continued from page* 45)

powered by the V-8 Chrysler engine, and the Cadillac-Allard is Cadillac powered. American stock car engines took five of the first six places in the Grand Prix.

This sport car event is sponsored by the Sports Car Club of America, an organization nurtured and maintained by the solidly growing body of sports car enthusiasts in this country. It conforms to the Sports Category laid down by the F.I.A. (Federation Internationale de l'Automobile). The essential specifications of this category require that vehicles which qualify must have at least two seats, mudguards, lights, self-starters and a door. Other requirements of the category set up certain standards for roadability, practical utility for normal use, and specify the use of "pump petrol," as the British put it.

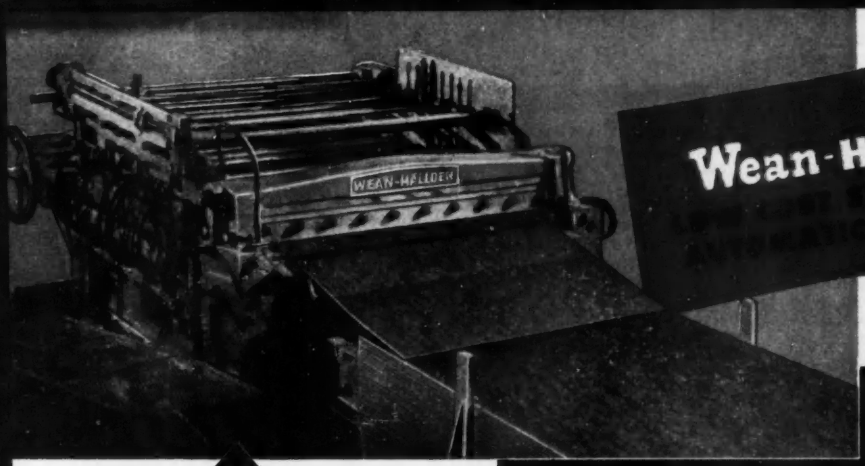
It is immediately obvious that cars which conform to this formula are much more akin to the average motorists' pride and joy than the conventional racing cars which participate in most racing events of Grand Prix character. This is true even when some of the above requirements are glossed over superficially and it explains at least in part why the SCCA and its Contest Board feel that their function as a governing and competition body can have more direct results in the engineering development of improved passenger cars than do other bodies which administer and regulate orthodox racing competitions.

It is of interest that several engineers from Chrysler, General Motors and Ford attended the event unofficially. Harley Earl, General Motors vice-president in charge of styling, exhibited the Le Sabre experimental car.

Whatever may eventuate in the evolution of this attitude into a conclusive and dynamic factor in the future of passenger cars in America, the SCCA has firmly established Watkins Glen as a shrine for its member devotees of the sports car religion, as well as for many thousands of lay admirers who gather to watch the contest.

Walters, considered by many followers of sports car events as the finest sports car driver in this country, demonstrated his mastery of car and course early in the contest, and in conclusive fashion. Bill Spear, in his sweetly-humming Ferrari, led the first lap in good style but Walters caught him smoothly on the home straight of the next lap and was never headed from this point to the wire. A little personal watch-clicking informed us that the redoubtable Walters was lapping steadily at speeds in excess of his own lap record of 5 min 13.5 sec, set up during the 1950 Seneca Cup Race.

(*Turn to page* 136, *please*)



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THE installation of a Wean-Hallden Synchronized Automatic Shear Line assures you the most efficient shearing operation available today. The Wean-Hallden, while actually requiring *less floor space*, delivers up to *twice the production*.

Infinite variable lengths from 12-inches to 12-feet at speeds up to 200 FPM with accuracy better than commercial tolerances means faster production, reduced labor costs and minimum scrap loss for you. *Before You Buy—Investigate Wean-Hallden.*

If you are in the business of handling strip steel or fabricating steel parts or products from strip steel you should give your slitting operation high consideration.

Well designed slitting lines enable you to reduce inventories, lower labor costs and eliminate expensive extras. Wean engineered slitting lines give you these important factors at lowest initial costs.

If you have a slitting problem — or merely desire a check on the efficiency of your present operation — call in Wean specialists.

Wean *Equipment Corporation*

CLEVELAND, OHIO

Sports Cars

(*Continued from page* 134)

Until he chose to hold the pace, Walters was steadily pulling away from his second place colleague, John Fitch, and Spear in the Ferrari. The performance of all three Cunningham car-driver combinations was a pleasure to watch for all were operating smoothly and competently. Their braking and cornering at the end of the home straight was notably neat and effective and we thought it could be presumed that this neatness characterized their progress around the 6.6 mile public road circuit.

Cunningham himself, apparently running in the safety position, was performing in nice style albeit his pace was obviously well in hand. His position at the finish was some four min or so back of his leader but, even so, comfortably in advance of the remaining competition at all times. To us, the Allards appeared to be at somewhat of a disadvantage in handling, although they were driven well and hard by their respective helmsmen.

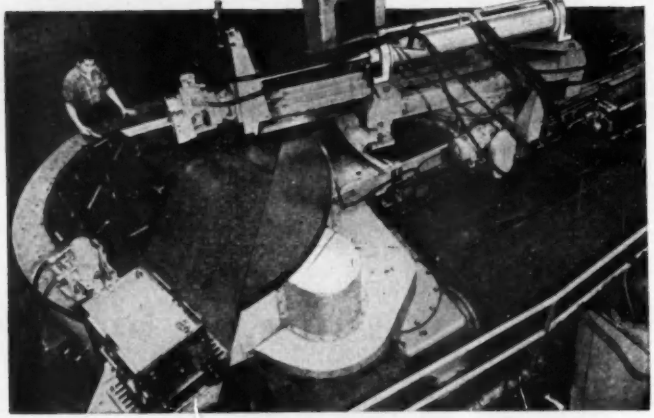
Although obviously large and weighty, the Cunninghams gave a convincing show of their forcefulness and stamina. It is obvious that these cars are the products of a capable, though very costly, design and construction program, and we understand that Mr. Cunningham is now in a position to manufacture these vehicles for such a market as may develop from their feats in competition.

It is our understanding that comparatively little fierce tuning has been done on the Chrysler Fire Power units. Naturally it may be quite safely supposed that a certain amount of parts juggling has been consummated by the Cunningham staff, and that this may even have been extended to a little mild cross-breeding between the escutcheons known to permit dimensional exchanges.

We have been led to believe on reasonably authentic information, however, that at least one of the Cunningham engines runs without a high-speed cam and that the compression ratio was not changed too much from the current stock engine. We did not learn which engine of the three thus remains mild and undistinguished, but we are constrained to testify that all three started, idled, and, most importantly, ran well at speed throughout the period of our observations.

As for chassis characteristics displayed at the Watkins Glen meet, a quick run-down will disclose the presence of independent front suspension on most of the cars which attained successes. In most instances the designs of these front ends were fairly well refined but practical. Steering layouts, as might be expected, were rather well executed. Brakes, of telling importance to say the least, were of a somewhat surprising smallness in diameter on several of the cars, although the designers undoubtedly had sound reasons for their various selections. The Ferraris, notably, come to mind in mentioning brake diameters. They appeared small to us in view of the performance which these cars can attain. Rear axles, in most cases, were fixed and sprung conventionally. Both disk and wire wheels were in evidence.

50-Ton Contour-Former Employs Giant NOPAK Cylinder



Built by the Cyril Bath Co., Cleveland O., this powerful machine is used to shape curved aluminum airplane fuselage parts. A NOPAK Model "A" 10" x 80" Hydraulic Cylinder . . . operating at 1500 P.S.I. . . . works in conjunction with the forming die, mounted on a gear-driven turntable, to stretch-form an infinite number of curved structurals . . . with 700 different dies now in use.

Very likely the efficiency of machines you build or use can be stepped up substantially through the correct use of NOPAK Valves and Cylinders.

GALLAND-HENNING MFG. CO., 2774 S. 31st Street, Milwaukee 46, Wis.

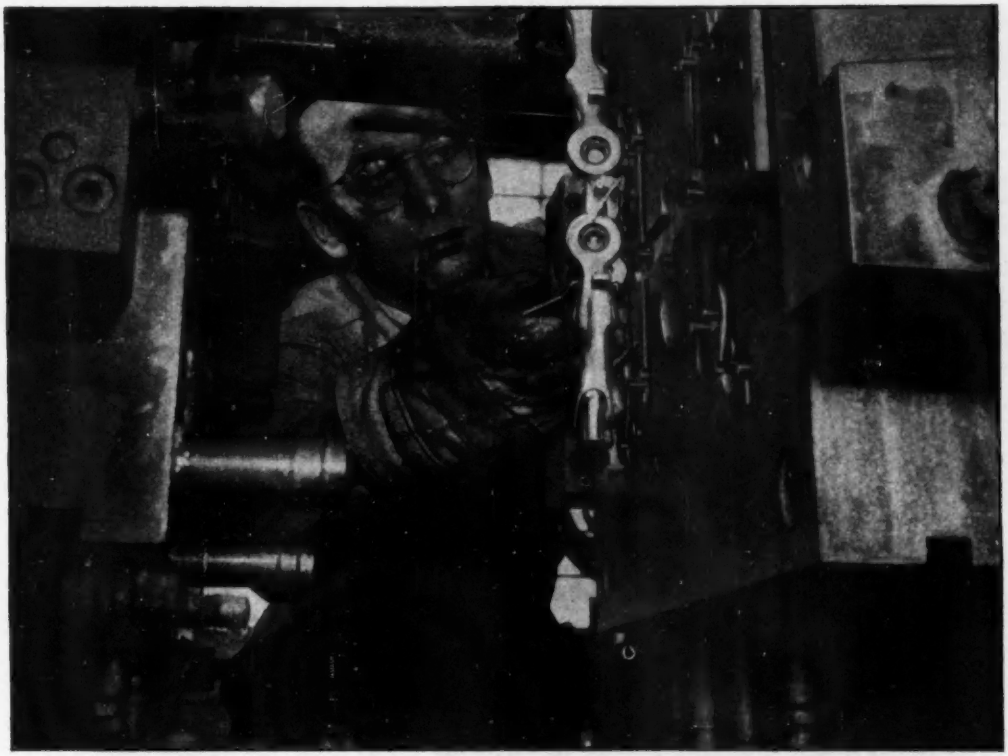
Refer to Sweet's File for Product Designers or write for Bulletin SW-1

NOPAK
VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE
A 5984-½I-A

BOOKS . . .

MERRY OLD MOBILES ON PARADE, by *Hi Sibley*, published by *The Goodheart-Willcox Co., Inc., 1321 South Michigan Avenue, Chicago 5, Ill.* Price $2.50. This book contains a collection of photographs, drawings and cartoons of pioneer automobiles from the first steam military tractor built in France 180 years ago on through the earliest American makes to 1917.

THE AIRCRAFT INDUSTRY—A Study in Industrial Location, by *William Glenn Cunningham*, published by *Lorrin L. Morrison, 1915 South Western Avenue, Los Angeles 18, Calif.* Price $6.00. The book gives a comprehensive survey of aircraft manufacturing from the birth of the industry in 1951, with emphasis on the locational pattern in each period of its development.



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No matter where you are located, you are cordially invited to consult us about your casting requirements for civilian or defense needs. We have sales engineers and representatives in leading cities. If you do not know the name of our man nearest you, write direct to us. ALUMICAST CORPORATION, 1521 N. Kilpatrick Avenue, Chicago 51, Illinois.

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work better... last longer

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On your next gear problem, call in FAIRFIELD at the start. FAIRFIELD engineers are qualified to make expert recommendations that may save you time, money and future concern about gear performance in your product. Write for interesting, illustrated brochure.

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SPUR • WORMS AND WORM GEARS

FAIRFIELD MANUFACTURING CO.

for FINE GEARS

319 S. Earl Ave. Lafayette, Indiana

The Machinery Industry

(*Continued from page* 51)

and area labor-management committees give special attention to solving problems of the industry. Local employment offices were also requested to call on each machine tool plant in their area of jurisdiction to work with those plants in solving manpower problems.

Field representatives of the Bureau of Apprenticeship have been instructed to advise plants concerning the establishment of organized apprenticeship programs. They have also been advised to discuss with plant management the establishment of short-term on-the-job training and skill improvement programs.

The DMA has also begun the preparation of guides for recruiting women employes for the industry.

New Developments

Danly Machine Specialities, Inc., of Chicago is producing a new line of hydraulic piercing equipment. Made for operations in the automotive industries, including aircraft, this piercing equipment was originally patented by the Mueller Engineering Co. of Dearborn. The company expects the machine to play a big part in the production of gas turbine aircraft engines.

Another new development from the Chicago area was announced this month by the Onsrud Machine Works, Inc. Onsrud held an open house to publicly display its new power feed router and skin mill. This completely new machine has been designed for the production of aircraft parts.

Shipments Gain

Shipments of machine tools during August turned upward after a small decline in July, but still we are under the high point of this year established during June. The National Machine Tool Builders Association reports that August shipments stood at an index figure of 177.3, up from 144.7 in July but still below the high point of 182.6 in June. New orders during August showed a small drop standing at 488.3 compared with 490.6 in July. The Association also has established a new index which shows the ratio of unfilled orders to shipments. The new index was 22.8 to one in August compared with 22 to one in July and 20.9 to one in June.

John C. Sears has been selected as the new executive secretary of the American Gear Manufacturers Association. He succeeds Newbold C. Goin whose resignation was announced at the gear makers annual meeting in June.

Read AUTOMOTIVE INDUSTRIES

Are you turning in all your SCRAP?

Don't wait for "George" to do it

IF you are a steel user, this important job of getting more scrap back to the mills is directly up to *you*. You just cannot afford to sit idly by while the scrap shortage gets worse. For unless everyone really pitches into this job of digging out all the scrap possible, steel production is bound to suffer, and every steel user, in more or less degree, will suffer too.

More scrap means *more* steel—it's as simple as that.

Right now some mills have only a bare two-days' supply of scrap on hand. Others have even less. Some steel-making furnaces already have had to shut down for lack of scrap. The situation is serious. Only you can help improve it.

By turning in every piece of worn-out equipment, every obsolete tool and machine, in fact every pound of iron and steel scrap you can comb out of your plant, you'll be helping relieve the worst scrap shortage since Pearl Harbor days . . . and the steel industry will be able to produce more of the steel you need.

Remember—it takes at least one-half ton of scrap to make one ton of steel. To maintain steel's present high production schedules requires more than 1400 carloads of industrial scrap *every* day. So turn in your scrap—ALL your scrap—and keep the mills rolling. This is more than a shortage. It's an emergency that vitally concerns you—and us—and the Nation.

You'll find your local scrap dealers listed in the yellow pages of the phone directory.

USS

1-1248

This page would ordinarily be used to tell you about

AMERICAN QUALITY SPRINGS

but, because without SCRAP we cannot produce steel, we are asking instead for your all-out help in getting more SCRAP to the mills.

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COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

Kester Solder

Kester engineers, with over 100,000 different types and sizes of solder available, will specify the right flux-core solder that will give maximum efficiency and economy to the job.

Easier to Use

Using the most suitable solder for each operation will enable solderers to work at top speed without sacrificing quality. Waste is eliminated and rejects are held to a minimum.

Top Quality

Kester Solders are made from the finest grades of tin and lead available. Fluxes — chemically and scientifically correct.

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Send for free manual, "SOLDER and Soldering Technique."

KESTER SOLDER

Standard for Industry since 1899

Business Pulse

(*Continued from page 62*)

prevalent opinion seems to be that such demand will probably increase steadily, though moderately, during the remainder of the year, although war on an expanded scale might cause a repetition of the post-Korean buying waves. Recent declines in output aimed at inventory reduction at manufacturing and distribution levels, tend to reflect this view of the demand situation held in some business quarters. Department store sales, a sensitive indicator of consumer demand, rose less than seasonally during the first three weeks of September, according to the Federal Reserve, suggesting that price reductions and vigorous promotional campaigns had not altogether overcome consumer reluctance to spend, despite the fact that personal income in July stood at the high annual rate of $251.6 billion.

Greater Employment

The main factor in the picture of consumer demand, the level of employment, has risen steadily since June, unaffected by the slight recession in business activity. Between mid-July and mid-August the number of industrial, commerical and governmental jobs rose about 230,000, and total nonagricultural employment in August is placed at 46.7 million persons, or about 1.6 million more than in August of last year.

Employment figures tend to reflect the shifts in output reported above. The textile, leather, and apparel, household machinery, and automobile industries all report declines in employment in August, while defense-connected metalworking industries and durable-goods manufacturers in general enlarged their labor forces. The significance of defense production in relation to the labor market and thus to effective consumer demand is pointed up by a report from the Defense Manpower Administration stating that at the beginning of August defense industries employed four million persons, as compared with 2.7 million in the last quarter of 1950. The agency estimates that more than six million persons will be working in defense plants by the end of the year.

Defense Workers

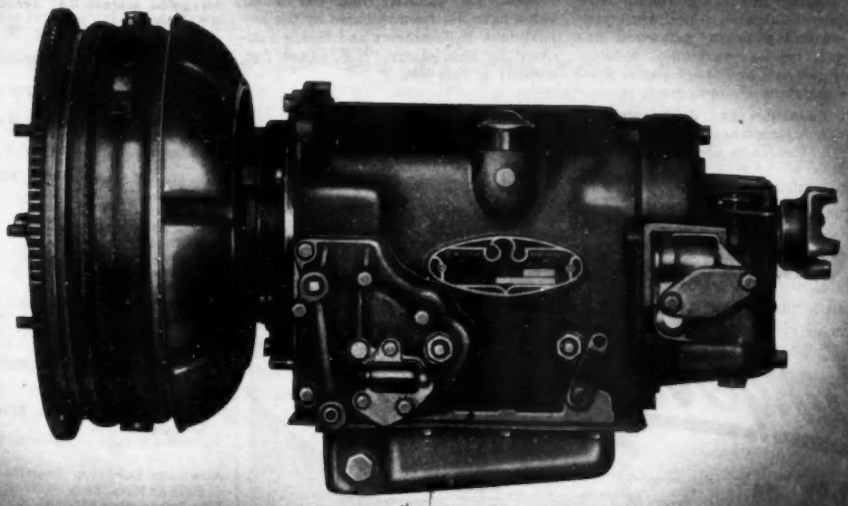
Defense production is expected to require the services of more than eight million people by the close of 1952. In August of this year only 2.5 per cent of the total civilian labor force was unemployed, which is fairly close to full-employment conditions. If the official schedule is realized, it seems likely that about two million persons will have to be drawn into the labor force who are

(*Turn to page 154, please*)

Detroit Gear

brings you truly

AUTOMATIC TRANSMISSION



without sacrificing any of the dependability of standard or overdrive transmissions

This simplest, most advanced no-shift drive ever developed gives the motorist . .

- Firm instant response to the power
- Full speed pick-up from standing start
- Rocking ability if car is stalled in mud or snow
- No creeping . . . no need to keep foot on the brake

For the best in Automatic Transmission Engineering and for Production that will meet your schedule requirements, write, wire or phone.

Detroit Gear

division of **Borg-Warner Corporation** BW detroit 14, michigan

Defense Contract Awards

This latest list of defense prime contracts that have been awarded covers the period from Aug. 1 to Sept. 20. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, warplanes, automotive components and spare parts, automotive maintenance equipment, etc.

Unit quantities and dollar amounts are given for contracts from $25,000 to $250,000. Contracts above $250,000 are indicated by "over $250,000," but their actual dollar amounts and unit quantities are not available. In some instances the quantity and the dollar value have not been released by the Department of Commerce and this is indicated by the letters "N.F." (not furnished) in this list.

—A—

Acme Chair Co., Reading, Mich.
Tank and vehicle parts—4000 ea.—$26,000

Donaldson AIR CLEANERS

Aero Products Div., General Motors Corp., Vandalia, O.
Facilities—over $250,000

Aircooled Motors Co., Syracuse, N. Y.
Maintenance—575 ea.—$25,261
Maintenance—575 ea.—$25,261

Aircraft Engineering & Maintenance Co., Oakland, Calif.
C-54 maintenance—over $250,000

Airesearch Mfg. Co., The Garrett Corp., Los Angeles 45, Calif.
Maintenance parts—N.F.

Aluminum Co. of America, Pittsburgh, Pa.
Facilities—over $250,000

American Airmotive Corp., Miami Springs, Fla.
Packard Merline engine parts—over $250,000

American Auto Parts Co., Inc., Kansas City 8, Mo.
Vehicle parts—3000 ea.—$65,700

American Blower Corp., Detroit, Mich.
Tank parts—N.F.

American Generator & Armature Co., Chicago 32, Ill.
Tank and vehicle parts—over $250,000

American LaFrance Foamite Corp., Elmira, New York
Fire truck—over $250,000

American Locomotive Co., Schenectady, N. Y.
Tank parts—over $250,000

The American Welding & Mfg. Co., Warren, O.
J-47 engine components—over $250,000

—B—

Beech Aircraft Corp., Wichita, Kansas
Wing tanks—27 ea.—$45,599
T-33 A and F-94—over $250,000
Wing tanks—20 ea.—$45,599
Fuel tanks—over $250,000

Bell Aircraft Co., Niagara Falls, N. Y.
Bomb tails—over $250,000

Bendix Aviation Corp., Bendix Products Div., South Bend, Ind.
Wheel assembly—756 ea.—$170,007
Brake assembly—731 ea.
Wheel assy.—237 ea.—$49,550
Brake assy.—229 ea.
Wheel and brake—449 ea.—$74,730

Benson Mfg. Co., Kansas City 1, Mo.
Stator assys., aircraft—N.F.

Boeing Airplane Co., Seattle Div., Seattle, Wash.
Kits, installation—98 ea.—$65,414
Gas turbine—over $250,000
Gas turbine—$60,000
Services—over $250,000
Machinery and equipment—over $250,000

Boeing Airplane Co., Wichita, Kansas
Facilities—over $250,000

The Buda Co., Harvey, Ill.
Generator sets, 15KW—8—$29,710
Spare parts for generators—job—$79,350
Generator sets, 60KW—8—$55,000
Generator sets, portable, skid mounted, 60KW—5—$39,615
Buda LO 525 engines—50 ea.—$89,000

(*Turn to page* 144, *please*)

(Advertisement)

BUSINESS IN MOTION

To our Colleagues in American Business . . .

The fact that a Revere Distributor is now celebrating its 125th anniversary year is an indication of the service the company has given its customers through those years. It is also another proof of the essential function performed by distributors for American industry. Most goods, whether industrial materials such as copper and copper alloys, aluminum alloys, iron and steel, or consumer articles such as refrigerators, radio and television receivers, kitchen utensils and ranges, go through the hands of distributors. Generally speaking, only the large buyers are in a position to purchase direct from manufacturers, who do not find it economical to handle the smaller orders. Yet those orders when pooled in the hands of an organization set up to handle them attain sizable totals, and hence a good distributor account is exceedingly attractive to a large manufacturer such as Revere.

A distributor serves not only the factories from which he buys. He also performs an invaluable service to his customers by making quickly available to them the products they require. A machine shop, for example, may need only a few hundred pounds of brass rod; there is a distributor within easy reach who can furnish it almost immediately. Or a contractor may want a few pieces of steel pipe and a thousand feet or so of copper water tube. Again, the distributor has them. A metal products distributor has to carry such items and an infinite number of others. The Revere Distributor who started in business 125 years ago actually has in stock 53,000 different items, cataloged, indexed, and held in warehouses ready for immediate shipment throughout its territory. Each month this stock is drawn upon by 5,000 to 8,000 customers, each order relatively small. There are many Revere Distributors with similar stocks and offering equal service.

To keep this distributor's warehouses filled with a balanced inventory, 18 people are required in his purchasing staff, which includes specialists in various kinds of materials, machines, tools and supplies. And to serve customers with information, quotations and the like, 25 salesmen are on the go constantly, calling on manufacturers, contractors, builders and stores throughout the busy industrial area in which the distributor operates. The large business done by the company is in great contrast to that of 125 years ago, when it was little more than a hardware store. The enterprise has grown in the American tradition of freedom to prosper in accordance with the principles of reliability and efficiency, fair dealing and integrity in performing a desired function.

Revere Distributors are selected for their ability to serve, and also chosen as to location, so that no matter where you are in this big country of ours, there is a Revere Distributor within easy reach. Today metal stocks may be short due to defense demands but manufacturers are doing everything possible to keep distributors supplied.

If you buy from distributors we suggest you remember that they are not only "central stockrooms," but have a great deal of special knowledge about the products they sell and can give you much helpful advice. Not only that, through the Revere Distributors you can be put in touch with the Revere Technical Advisory Service, which will cooperate with you on matters concerning the selection and fabrication of the Revere Metals. Our distributors, and those of every other manufacturer, render many essential services, both to those to whom they sell, and to those from whom they buy. The distributor system as it operates in the United States arose in response to the need for it. Today it fulfills that need more effectively than ever before.

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Sets NEW PERFORMANCE Standards

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RC-27A
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for
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Engines

• The new LORD RC-27A Dynafocal is setting higher standards for isolation of engine vibration. Design improvements give increased smoothness . . . greater economy . . . longer life —at all engine speeds.

Performance compromises necessarily inherent in many previous designs have been eliminated.

Superior efficiency reduces dynamic stresses throughout airframe structure . . . improves passenger comfort . . . reduces operating personnel fatigue . . . lowers maintenance costs.

LORD MANUFACTURING COMPANY
ERIE, PENNSYLVANIA

LORD
Vibration-Control Mountings
. . . Bonded-Rubber Parts

(Continued from page 142)

— C —

Cadillac Mtr. Car Div., GMC, Detroit, Mich.
Vehicle parts—$38,636

Canadian Commercial Corp., Montreal, P.Q., Canada
Aircraft parts—over $250,000

Canadian Commercial Corp., Washington, D. C.
40T-36A, twin engine trainers—over $250,000

Canfield Tool & Die Co., Detroit, Mich.
Spare parts—N.F.

Canton Drop Forging & Mfg. Co., Canton, O.
Facilities—over $250,000

Central Fire Truck Corp., St. Louis 10, Mo.
Truck, fire—45—$225,558

Champion Forge Co., Cleveland, O.
Facilities—over $250,000

Chandler Evans Div., Niles Bement Pond Co., West Hartford, Conn.
Maintenance parts—N.F.

Chrysler Corp., Fargo Div., Detroit, Mich.
Spare parts—N.F.

Cleveland Diesel Engine Div., General Motors Corp., Cleveland, O.
Parts, Diesel engines—N.F.

Coast Manufacturers, Concord, Calif.
Truck, fire—45—$244,218

Consolidated Vultee Aircraft Corp., San Diego, Calif.
Modification of B-36 airplanes—over $250,000
Machinery and equipment—over $250,000

Continental Motors Corp., Muskegon, Mich.
Engines—over $250,000
Engines—over $250,000
Aircraft engines—over $250,000
Engines—over $250,000
Engines, spare parts and data—over $250,000

Crenshaw Equipment Co., Richmond, Va.
Truck, fire—12—$58,927

Cummins Engine Co., Inc., Columbus, Ind.
Parts, Diesel engines—N.F.

Curtiss-Wright Corp., Caldwell, N. J.
Services—$50,000

— D —

Dakota Fire Apparatus Co., Sioux Falls, S. Dak.
Truck, fire—40—$248,000

Dana Corp., Toledo 1, Ohio
Tank and vehicle parts—6944 ea.—$42,894

W. S. Darley & Co., Chicago, Ill.
Truck, fire—30—$148,159

The Dayton Rubber Co., Dayton 1, Ohio
Belt, fan—53,334 ea.—$39,901
Hardware—276,234 lb.—$68,285

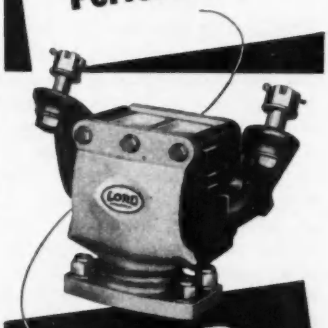
Delco Products Div., General Motors Corp., Dayton, Ohio
Facilities—over $250,000

Detroit Aluminum & Brass Corp., Detroit 11, Mich.
Tank and vehicle parts—over $250,000

Diamond T Motor Car Co., Chicago, Ill.
Vehicle parts—1140—$105,722

(Turn to page 146, please)

How to Harness 3250 Horsepower for Smooth Performance



LORD
DYNAFOCAL
ENGINE MOUNTINGS

There is a LORD Dynafocal Engine Suspension for every commercial and military aircraft requirement—including the latest and most powerful engines. Typical of these is the MR-43 Dynafocal which LORD designed and produced for the 3250 hp Wright C-18 Turbo Cyclone engine which powers the Lockheed P2V and the Martin P5M.

The MR-43 Dynafocal has an exceptionally low natural frequency which enables it to isolate as much as 95% of engine vibration. The new type flexing element has greater oil resistance . . . is easier to clean and inspect . . . and is conservatively stressed. These and other improvements extend service life and improve performance.

LORD engineers specialize in methods for controlling vibration in aircraft and all other types of mechanical products. They can make your product more desirable . . . more salable . . . by giving it smoother, quieter operation. Submit details of your problems to Product and Sales Engineering Department.

LORD MANUFACTURING COMPANY
ERIE, PENNSYLVANIA

LORD
Vibration-Control Mountings
. . . Bonded-Rubber Parts

QUIETER OPERATION

SMOOTHER PERFORMANCE

BETTER SERVICE

LONGER LIFE

For more than 35 years the Automotive Industry has found you can always depend on clutches by

BORG & BECK®

For that vital spot where Power takes hold of the load!

BORG & BECK CLUTCH — THE STANDARD

The Standard Clutch—A Product of Borg-Warner

BORG & BECK Division

ENGINEERING B-W PRODUCTION

Borg-Warner Corporation
Chicago, Illinois

MAGNECORD Sound Research

SENDS A TIRE TO THE FRONT

Tough mud-slogging tires roll our forces toward the front. Behind rugged-duty tires lie months of sound research with Magnecord tape recorders . . . vibration tests to determine the wear and performance of new tires in development. Precision testing demands the finest precision tape recording.

Whatever your recording problem, Magnecorders offer greater flexibility, fidelity, features. Available for subsonic, audio or supersonic research, Magnecord can fill your most exacting requirements.

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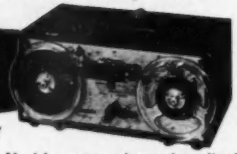

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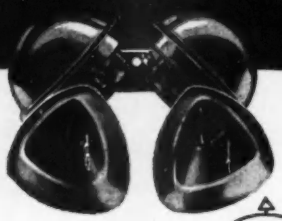

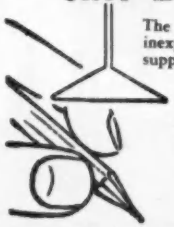

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(*Continued from page* 144)

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(*Turn to page* 148, *please*)

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Automotive . . . Aviation . . . and Allied Industries find new selling features and production advantages in ARDUX Resins.

Ardux resins fill a unique niche in product engineering today wherever the durable bonding of metals, (ferrous and non-ferrous), and plastics to natural or synthetic rubbers is required under extreme conditions of vibration, torque, friction, etc.

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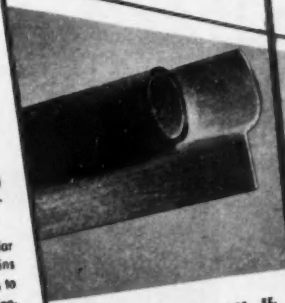

REDUCES STRESS FAILURE, EFFECTS OF SHOCK LOADING. A resin emulsion of low viscosity, Ardux 120 excels in bonding metals and plastics to natural or synthetic rubbers. Typical application is this rubber tubing bonded to aluminum alloy capping strip.

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HIGH STRENGTH AT HIGH TEMPERATURES. Ardux 164 is specifically formulated to simply and durably bond brake linings and clutch plates. Retains high strength at temperatures up to 250°C.

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(*Continued from page 146*)

Goodyear Tire & Rubber Co., Inc., Akron, O.
Wheel assemblies—408 ea.—$62,243
Brake assemblies—347 ea.
Wheel assy.—295 ea.—$30,732
Brake assy.—295 ea.
Spare parts—7 ea.
Wheel and brake assys.—$26,941

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Heintz Mfg. Co., Phila., Pa.
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Hotpoint, Inc., Chicago, Ill.
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Turbosuperchargers—over $250,000

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Indiana Gear Works, Inc., Indianapolis, Ind.
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Ingersoll Products Div., Borg-Warner Corp., Chicago, Ill.
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Facilities—over $250,000

International Harvester Co., Washington, D. C.
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Truck, 5-Ton 4 x 2—108—Over $250,000

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Jack & Heintz Prec. Industries, Cleveland, Ohio
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Facilities—over $250,000

— K —

Kenworth Motor Truck Corp., Seattle, Wash.
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Keystone Bolt & Nut Corp., New York 7, N. Y.
Tank and automotive supplies—var. quan., 10 itms—$41,098

Walter Kidde & Co., Inc., Belleville, N. J.
Tanks & combat vehicle parts—3006—$37,-157

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Landers, Frary & Clark, New Britain, Conn.
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Facilities—over $250,000
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Maintenance of, aircraft—over $250,000

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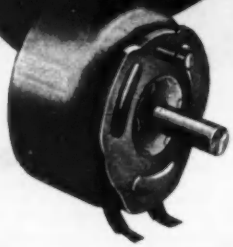
McCreary Tire & Rubber, Indiana, Pa.
Tire, pass.—3108 ea.—$86,009

(*Turn to page 150, please*)

LEDEX

ROTARY SOLENOID



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The many production applications of Ledex Rotary Solenoids vary from the dependable, snap-action tripping of airborne bomb releases to the actuation of rugged, hydraulic valves in heavy duty materials handling equipment.

Five Ledex Rotary Solenoid models are manufactured. Diameters range from 1⅛ to 3⅜ inches. Predetermined rotation up to 95° can be engineered to suit your product's requirements. Starting torques for 45° stroke range from ¼ pound-inches to 50 pound-inches.

We supply to quantity users and solicit the opportunity to be of assistance in engineering a Ledex Rotary Solenoid to meet your product's requirements.

MODEL NO.	2	5	6	7	8
Diameter	1⅛"	1⅞"	2¼"	2¼"	2⅞"
Torque lb. / inches	¼	5	10	25	50
Weight lbs.	⅛	½	1	2¼	4¼

Magnetic action moves the armature along the solenoid axis. This action is converted into a rotary motion by means of ball bearings on inclined races.

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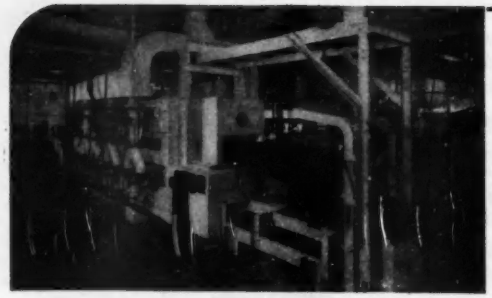

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of small and medium size parts

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Turn Signal Switches

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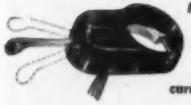
Semi- automatic, self-cancelling. Afford drivers easy, positive way to indicate turns to approaching and following traffic as well as to pedestrians.



Mitchell clamp-on and screw-type semi-automatic turn signal switch for trucks, cars, buses, tractors.

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CHICAGO 28

Air Cleaners • Metal Stampings

(*Continued from page* 148)

M-D Parts Mfg. Co., Los Angeles 23, Calif.
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Marmon-Herrington Co., Inc., Indianapolis, Ind.
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Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
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Minnesota Fire Equpment Corp., North Branch, Minn.
Truck, fire—45—$218,070

Monroe Auto Equipment Co., Monroe, Mich.
Tank and vehicle parts—280 ea.—$36,192

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North American Aviation, Inc., Columbus, O.
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Aircraft parts—over $250,000

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Pacific Airmotive Corp., Burbank, Calif.
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Overhaul engines—over $250,000
Overhaul engines—150 ea.—$200,000

Packard Motor Car Co., Detroit, Mich.
J-47 engines—over $250,000

Pesco Products Div., Bedford, Ohio
Brush—N.F.

Piasecki Helicopter Corp., Morton, Pa.
Rotor blades—3 ea.—$74,209

Pierce Governor Co., Inc., Anderson, Ind.
J-47 engine—over $250,000

Premier Industries Corp., Monroe, Mich.
Tanks and combat vehicle parts—4195—$178,374

— R —

Republic Aviation Corp., Farmingdale, L. I., N. Y.
Machinery and equipment—over $250,000

Rett Products Co., Detroit, Mich.
Spare parts—N.F.

— S —

Schultz Bros., Inc., Saginaw, Mich.
Tank and vehicle parts—189—$29,164
Tank, automotive parts—N.F.

Scintila Magneto Div., Bendix Aviation Corp., Sidney, N. Y.
Parts—36 items—$138,357
Parts and magnetos—over $250,000

Sikorsky Aircraft Div., United Aircraft Corp., Bridgeport, Conn.
Helicopter H-19A—1 ea.—$245,510

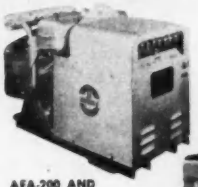
Solar Aircraft Co., San Diego, Calif.
J-47 sub-assemblies—over $250,000

Sperry Gyroscope Co., Great Neck, L. I., New York
Control units—187 ea.—$194,293

(*Turn to page* 152, *please*)

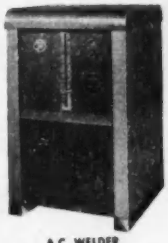
For The FINEST In WELDERS It's miller

Since 1929 MILLER Welders have become the standard by which all others are judged for performance, ease of operation, maintenance cost, and increased production. Every welder is thoroughly and completely tested before leaving the factory — and thoroughly guaranteed. Ask the MILLER distributor in your territory for a demonstration of MILLER Welders.



AEA-200 AND AEA-200-L

SELENIUM RECTIFIER TYPE D.C. ARC WELDER



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Can you picture a millionth of an inch? About the thickness of a shadow would come close to describing it. Yet—parts for American Bosch diesel fuel injection equipment are produced to accuracy tolerances of millionths of an inch every day *on a production basis.*

Such precision manufacture explains the dependability of diesel fuel injection equipment supplied by American Bosch.

Combined with constant development and field engineering and extensive service facilities, it helps explain, too, why American Bosch-equipped diesel engines continue to set new standards of efficiency and economy in ever-widening fields of application.

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Ace Nylon Balls of DuPont Nylon FM #10001 are mass produced to close tolerances giving you the advantages of toughness at low temperatures, form stability at high temperatures, light weight, chemical and abrasion resistance.

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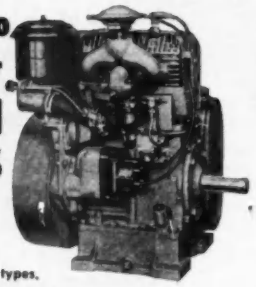
POWER ADVANTAGE in the 7 to 13 hp. Range...The 2-Cylinder

WISCONSIN
Air-Cooled ENGINES



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1. Dependable air-cooling under all climatic and weather conditions.
2. Self-cleaning tapered roller bearings at both ends of the crankshaft to withstand either side-pull or end-thrust without danger to bearings.
3. Rotary type high tension OUTSIDE Magneto with Impulse Coupling operates as an entirely independent unit that can be serviced or replaced in a few minutes.
4. Maximum torque at usable speeds for equipment that really has to go to work.

CONDENSED SPECIFICATIONS

MODELS		TE	TF
Bore	inches	3	3¼
Stroke	inches	3¼	3¼
Piston Disp. cubic inches		45.9	53.9
Horsepower			
1400 rpm		7.2	8.6
2000 rpm		10	12
2600 rpm		11.2	13.3
Net weight in lbs., Standard engine, side-mount tank		220	220

Our engineering department will gladly cooperate with you in adapting Wisconsin Engines to your requirements. Write for detailed data and name of the nearest Wisconsin distributor.

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN

(*Continued from page* 150)

Standard Pressed Steel, Jenkintown, Pa.
Hardware—120,000 ea.—$67,536

Steel Products Engineering Co., Springfield, O.
Facilities—$235,000

—T—

Taylor Forge & Pipe Works, Chicago, Ill.
Facilities—over $250,000

Telegraph Machine & Tool Co., Pontiac, Mich.
Case, differential assy.—N.F.

Texas Engineering & Mfg. Co., Inc., Dallas, Texas
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Thompson Products Div., Cleveland 17, O.
Aircraft pump assys.—127 ea.—$33,630

Thompson Products, Inc., Cleveland, Ohio
Facilities—over $250,000
Facilities—over $250,000
Facilities—over $250,000

Thurman Machine Co., Columbus, O.
Tank and vehicle parts—1283 ea.—$36,757
Vehicle parts—8580 ea.—$196,468

Titeflex, Inc., Newark, N. J.
Parts—15 itms—$69,428
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Tank parts—7000 ea.—$26,670

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Cover, diff. com. case—400 ea.—$47,972
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U. S. Motor Truck Sales, Detroit 27, Mich.
Tank parts—N.F.

—V—

Vickers, Inc., Detroit, Mich.
Pump and motor assys—170 ea.—$146,408

—W—

Ward LaFrance Truck Corp., Elmira, N. Y.
Truck, fire—over $250,000
Truck parts—$108,823

Westinghouse Electric Corp., Dayton, O.
Automatic pilot—over $250,000
Machinery and equipment—over $250,000

Whirlpool Corp., St. Joseph, Mich.
Facilities—$179,000

The White Motor Co., Cleveland, Ohio
Truck, 5-Ton 4 x 2—over $250,000

Willys-Overland Co., Toledo, O.
Trucks, 1 ton—20 ea.—$26,410

Willys-Overland Motors, Inc., Anderson, Ind.
J-47 engine—over $250,000

Wright-Aeronautical Corp., Wood-Ridge, N. J.
Parts for R-3350 aircraft engines—over $250,000
Facilities—over $250,000
Engines—over $250,000

Wyman-Gordon Co., Worcester, Mass.
Facilities—over $250,000

"Flying Workhorse" picks up 71% assembly savings...73% weight savings

Piasecki Helicopter Corporation uses Tubular SPEED CLIPS® to make spectacular savings over previous method of attaching blanket insulation

The "flying workhorse" for the Air Force and the Army, Piasecki's new helicopter carries aboard a top-flight example of SPEED NUT savings.

Blanket insulation has to be attached inside the craft in over 700 locations. The old fastening method needed revising to save assembly time and, more important, to save weight. The perfect answer . . . Tubular SPEED CLIPS and standard rivets. *They could take the place of complicated previous methods, and provide an amazing 71% assembly saving, and a total weight savings of 73%!*

Now Tinnerman Tubular Clips, along with hundreds of other SPEED NUTS, are specified for use on all Navy HUP-1 craft and also are used on the new Piasecki H-21 Air Force Assault and Army Transport Helicopter.

With today's production schedules . . . and budgets . . . it's well worthwhile to *"check the Tinnerman line before you design."* Write for more reasons why, presented in new 24-page booklet "A Story of Quality." TINNERMAN PRODUCTS, INC., Dept. 12, Box 6688, Cleveland 1, Ohio. *In Canada:* Dominion Fasteners Ltd., Hamilton. *In Great Britain:* Simmonds Aerocessories, Ltd., Treforest, Wales.

OLD METHOD
CLIP
RIVET
NUT
WASHER
INSULATION BLANKET
GLOVE FASTENER STUD
GROMMET BUTTON
SPEED CLIP METHOD
TINNERMAN TUBULAR CLIP SC 2733
INSULATION BLANKET
CLEARANCE HOLE
STANDARD RIVET
Drawings at left show obvious SPEED CLIP savings. Old method required complicated clip assembly to be riveted to panel. SPEED CLIP needs only clearance hole in existing panel and rivet to provide vibration-proof attachment.

Magnaflux plays an important part in building safety into jet engines. With *every* part a critical part, it is essential that cracks and flaws be discovered *at time of production and throughout maintenance*, no matter how minute or well hidden.

That's why all jet engine manufacturers use Magnaflux to find hidden defects in metals—to show up cracks too small for the human eye to see. Magnaflux makes invisible cracks instantly visible, even when below the surface, in the making and maintenance of many products—from automobiles to locomotives, from sewing machines to sleeping cars!

Magnaflux is low in cost, nondestructive—*and so fast that it performs at production line speeds!* **. . . For detailed information write for literature—how Magnaflux saves money and lives, described on request without obligation.**

MAGNAFLUX

DETECTS DEFECTS

MAGNAFLUX CORPORATION

5904 Northwest Hwy. • Chicago 31, Illinois

New York . Dallas . Detroit . Cleveland . Los Angeles

Business Pulse

(*Continued from page* 140)

now not employed or only partly employed, while about two million persons must be diverted from consumers' goods output. This has a certain inflationary significance, regardless of the present status of civilian goods inventories.

A main deterrent to producers of consumers' goods has been the short supply of important metals. The primary source of pressure on such producers is the increasing demand for metals used in the production of military equipment, but the level of supplies has been influenced since May by declining imports of metals and manufactures and by lower output of some metals due to labor disturbances. A report issued by the Senate Small Business Committee in September stated that the tight supply situation has resulted in "gray" markets and that the free supply of "a dozen critically needed materials" has been virtually cornered.

Metal Supply

Steel is broadly illustrative of the demand-and-supply picture in metals. In August the output of raw steel amounted to 8.7 million net tons, the highest ever achieved in that month, and weekly production in September was above last year's output. Yet steel allocated for consumers' goods in the fourth quarter was cut back in September from 70 to 58 per cent of pre-Korean consumption. Steel scrap is still in short supply, and some plants in September were said to be operating on inventories of one week's or even one day's supply.

A similar condition is true of copper and lead. Charles E. Wilson, Director of Defense Production, describes the copper situation as a "hand-to-mouth existence." Defense production officials have stated that copper supplies for consumers' goods will be lowered from 60 to 64 per cent of pre-Korean utilization. Shortages of copper and copper-base alloy scrap have already forced a virtual shutdown of the brass and bronze ingot industry, where smelters in the Chicago area are reported to be working at 25 to 35 per cent of capacity. Demand for lead in September far exceeded the amount actually made available. The NPA received requests for approximately 90,000 tons, of which only 28,000 tons was initially allocated. As a result of the mine and smelter strike, the agency announced that its original allocations would be reduced by 35 per cent.

Officials in the Defense Production Administration have stated that shortages of steel, copper, and aluminum for civilian consumption are likely to continue through 1953. Manufacturers have emphasized that even withdrawals from national stockpiles will not alter

PRECISION MADE

Pheoll

SCREWS, BOLTS, NUTS and SPECIAL FASTENERS

save assembly time
improve product strength
and final appearance

ACCURATE THREADING SAVES TIME

Pheoll Screws, Bolts, and Nuts are easier to start, easier to drive and easier to tighten—because they're accurately machined and threaded. These features cut your assembly time and cost.

COLD ROLLED THREADING ADDS STRENGTH

The grain structure and flow of metal obtained through cold heading and roll threading increases the structural strength of Pheoll Fasteners. Cold working improves thread bearing surfaces, providing greater area of contact for firmer grip. Greater strength reduces possibility of shearing, and time lost in subsequent removal and retapping.

***OUR* INSPECTION IMPROVES *YOUR* PRODUCT APPEARANCE**

Step by step Pheoll inspection, through every process of production, assures uniform head size and shape; cleanly milled and recessed heads, neat chamfering and countersinking. All these factors contribute to the quality and finish which add materially to your product's final appearance. ***Write*** for Pheoll's product literature and price list.

THESE PHEOLL PRODUCTS INCREASE YOUR PRODUCTION RATE. Thumb Screws Machine Screws† • Wood Screws† • Sheet Metal Screws† • Stove Bolts† • Rolled Threaded Wires and Studs • Special Rivets and Pins • Brass Washers

†Furnished in slotted and Phillips Recessed Head Types

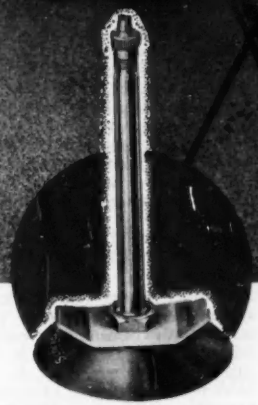
Pheoll

MANUFACTURING COMPANY

5700 ROOSEVELT ROAD
CHICAGO 50, ILLINOIS

SCREWS • BOLTS • NUTS

Industrial Fasteners and Holding Devices



Tires that bring home the bacon

The trucking industry keeps growing . . . it has doubled since 1939. Trucks carrying everything for home, farm and industry roll billions of miles on tires that stand up under severe punishment. Vital to getting the load through is the tire valve that *locks* the air in the tire.

Schrader—leading tire valve manufacturer—not only provides a dependable product, but anticipates the industry's trends . . . constantly modernizing factory equipment and procedures to meet the tire manufacturers' requirements for a quality product . . . that's why the tire manufacturers rate Schrader their prime source of supply.

A. SCHRADER'S SON, BROOKLYN 17, N. Y.
Division of Scovill Manufacturing Company, Incorporated

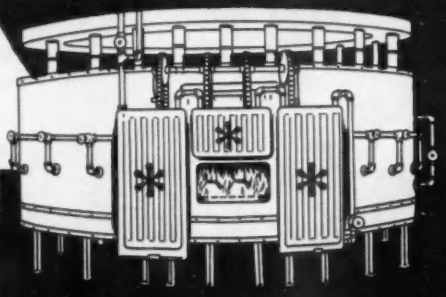
Schrader
REG. U. S. PAT. OFF

FIRST NAME IN TIRE VALVES

FOR ORIGINAL EQUIPMENT AND REPLACEMENT

PLATECOILS replace pipe coils

in the plant of a PROMINENT MOTOR CAR MANUFACTURER



and improve working conditions
cut maintenance costs
save down time

The unique application of Platecoils as a heat shield for a Rotary Hearth Furnace has resulted in many cost-saving advantages for a prominent motor car manufacturer.* It is no longer necessary for operators to leave work every half hour as was formerly done. The Platecoils cool so much more efficiently than the pipe coils previously used that working conditions have been greatly improved.

Then too, the pipe coils would occasionally rust through, necessitating shut down of the entire department. Use of Platecoils has eliminated these shut-downs and effected savings of several hundred dollars yearly in maintenance costs alone. Although the original cost of Platecoils is greater, they will pay for themselves many times over in the next few years.

Whatever your tank heating or cooling requirements, Platecoils will give you greater efficiency and dependability . . . at less cost to you. Get the facts today, send for bulletin No. P74.

*Name on request

Cleaned and Repaired Without Dumping Tank Solution
Greater BTU Transfer Per Unit Area
Weighs Only Half as Much as Pipe Coil
No Threaded Joints in Tank
Increased Tank Capacity
Fast, Easy Installation
Easy to Clean

PLATECOIL
Division
KOLD-HOLD MFG. CO.
LANSING 4, MICHIGAN

current shortages before January, because the "pipelines" for plant-to-plant distribution of semi-finished metal parts have been depleted in many industries.

Federal Deficit Increase

Although the Federal tax bill has yet to be finally determined in conferences committee of the Senate and House, it appears that the Administration will receive about $3.5 billion less in new revenue annually than it requested from Congress. The Congressional attitude seems to be that the Administration underestimates prospective yields from the new bill and that the deficit will be correspondingly smaller. On the other side of the ledger, the economy bloc continues to press for reduction of nonessential expenditures —though few observers believe that the Government will actually be run on anything approaching a pay-as-we-go basis. Meanwhile, the Federal deficit rose to $3,661 million during the first two months of this fiscal year, and in September the Treasury resumed borrowing about $100 million more each week than was needed to cover maturing obligations.

NEW EQUIPMENT

(*Continued from page* 56)

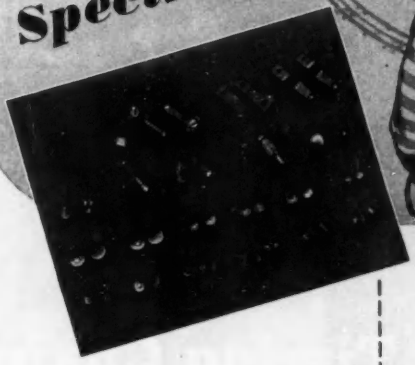
in the hydraulic cylinder—the basic unit of the machine. Built-in blankholding and stripping action, which is entirely automatic, is actuated hydraulically after the power stroke. It is said that the compactness and rigidity of this construction permits producing holes under difficult conditions, such as punching steel that is thicker than the hole diameter. In one instance, it is reported that 21/64-in. diam holes are punched in 5/16-in. thick high carbon SAE 1095 steel heat treated to 41 Rockwell C.

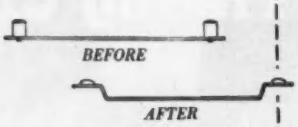
Principle features of the hydraulic system include continuous pressure intensification which permits wide flexibility in adding cylinders in the circuit of the power unit. A transfer valve permits handling extremely high pressures while eliminating hydraulic shock in the circuits. These features are the basis for capacities up to over 200 tons in relatively small compact cylinders, according to the company.

AUTOMOTIVE INDUSTRIES . . .

is your News Magazine of Automotive and Aviation

MANUFACTURING





MALLORY SILVER CONTACTS

Fine and coin silver, while having desirable properties for many applications, do not provide the physical properties required for some applications. To cover these applications, Mallory has developed a series of silver base alloys. These alloys have such improved characteristics as greater resistance to wear, less sticking or metal transfer, and greater hardness. Mallory is fully qualified to recommend the best contact material for your design. Write today.

Mallory Engineering *Suggests New Contact Assembly . . . Saves Customer Money*

Hundreds of customers are profiting from Mallory contact know-how which simplifies design and production, saves valuable time and money.

A manufacturer of electric toy trains submitted a contact assembly job to Mallory which called for large silver contacts on a flat section of spring steel. Mallory suggested a re-design of the part enabling a great reduction in the size of the silver contact and utilizing a Mallory-developed welding technique to insure maximum mechanical strength. The customer was given improved performance . . . at a substantial saving!

That's result beyond specification!

Mallory contact know-how is at your disposal. What Mallory has done for others can be done for you!

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry St., Toronto 15, Ontario

Electrical Contacts and Contact Assemblies

P. R. MALLORY & CO. Inc.
MALLORY
P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

SERVING INDUSTRY WITH

Electromechanical Products
Resistors *Switches*
TV Tuners *Vibrators*

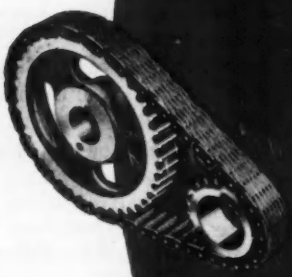
Electrochemical Products
Capacitors *Rectifiers*
Mercury Dry Batteries

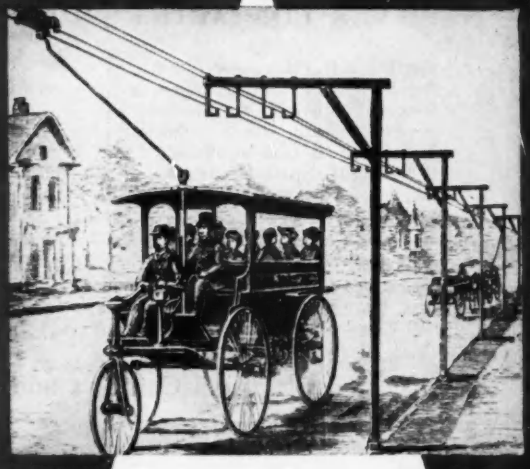
Metallurgical Products
Contacts *Special Metals*
Welding Materials

IN THE FEW SECONDS you'll need to read this page, Morse will produce from ten to fifteen precision timing chains. In a year's time, Morse produces more than 4,000,000, supplies more than 70% of all timing chains installed as original equipment on today's passenger cars.

Naturally enough, Morse is the leading manufacturer of automotive timing chains.

Morse *means* Timing Chains





MORSE CHAIN COMPANY
Dept. 203 • 7601 Central A[illegible]

MORSE
MECHANICAL
POWER TRANSMISSION
PRODUCTS

PRODUCTS OF B-W BORG-WARNER

This combination trolley and automobile of the early '80's really ran . . . became a forerunner of today's comfortable, reliable trolley bus. As the transportation industry has grown and improved, Morse Chains have matched it stride for stride, improvement for improvement.

This is one of a series of old prints of old machines (and ways of power transmission) that will appear in future Morse advertisements. Write for your free, enlarged copy, suitable for framing for your collection.

Drilling Problem?

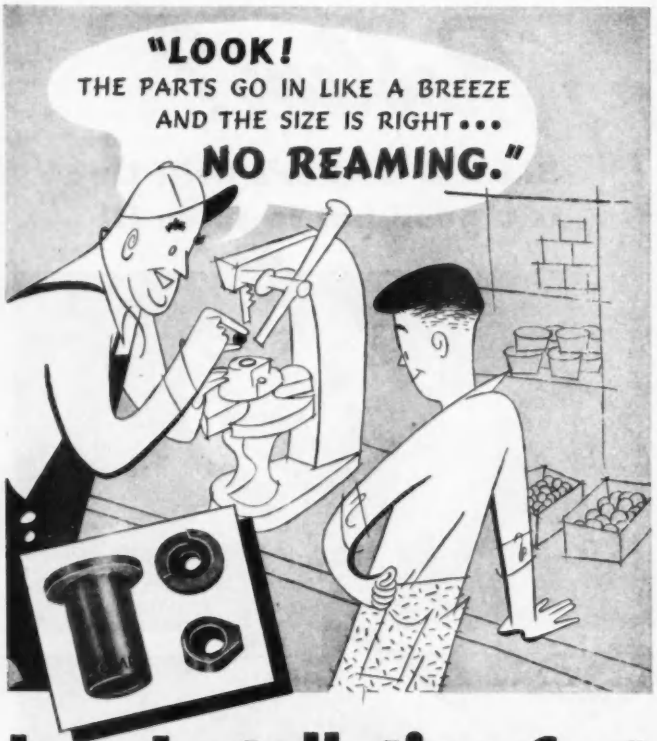
Black & Decker's Drill Line is a good bet to solve it!

Completeness of Line, Quality Construction Pay Off for Users!

FOR drills to fit your needs—for top performance on any portable drilling job—it pays to check Black & Decker *first!* That's because Black & Decker gives you an unmatched choice of Drill models. Capacities from ¼″ to 1¼″—choice of handle arrangement for easiest operation—choice of speed, power and price in most capacities. And it's also because Black & Decker Drills give you powerful B&D-built motors—full ball-bearing construction—extra-tough gears, shafts and chuck spindles—husky housings, streamlined design, perfect balance.

Whether your problem is in production, maintenance or construction—whether it requires large or small drills—see your nearby B&D Distributor *first* for expert help. And write today for free, detailed catalog to: THE BLACK & DECKER MFG. CO., 635 Pennsylvania Ave., Towson 4, Maryland.

WORLD'S LARGEST, MOST COMPLETE LINE



Low Installation Cost

is one of the 6* outstanding advantages of

"COMPO" and "POWDIRON" BEARINGS AND PARTS

Powder metallurgy bearings and parts made of "COMPO" and "POWDIRON" are the *right* size when they reach you and the *right* size after they're installed—no costly machining needed after installation! Bearings are quickly, easily installed by a simple press fit—usually eliminate need for oil holes or grooves.

Stock sizes of "COMPO" bearings save you the *most* money—write on company letterhead for the latest list.

Send for this *FREE* Booklet

***THE 6 OUTSTANDING ADVANTAGES OF "COMPO" AND "POWDIRON" ARE:**

1. Low installation cost
2. Extreme quietness
3. Efficient lubrication
4. Low operating and maintenance cost
5. High load capacity at high speeds
6. Low unit cost

BOUND BROOK

"COMPO" • "POWDIRON" • "BOUND BROOK"

OIL-LESS BEARING COMPANY

ESTABLISHED 1883

(Advertisement)

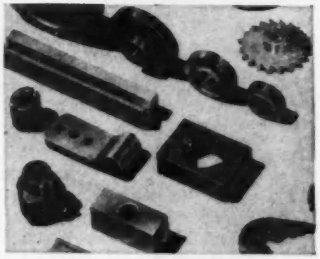
POWDER METALLURGY PARTS

SAVE MACHINING, CUT COSTS

Adaptability of powder metallurgy processes to the die-forming of simple or intricate shapes to final dimensions has opened the way to substantial savings in the production costs of many types of machines and appliances. Close tolerances are maintained in "COMPO" and "POWDIRON" parts formed by powder metallurgy—without any need for expensive machining operations either at the parts fabricator's plant or during the assembly process. Incorporation of "COMPO" and "POWDIRON" parts in product designs eliminates metal waste in turning and boring operations, and frees manpower and machinery for other activities.

QUANTITY-ECONOMY CONSIDERATIONS

Dies for the production of "COMPO" and "POWDIRON" bearings are available in an extensive range of sizes, and most of the more widely used sizes of "COMPO" bearings are carried in stock. Since special sizes and



Intricate shapes like these are readily die-formed to final dimensions from "COMPO" and "POWDIRON."

shapes require special dies, the advantages of powder metallurgy for the production of such parts are particularly marked where quantity requirements are high. The initial cost of the die is then more than offset by subsequent production economies.

FLEXIBILITY OF APPLICATION

"COMPO" and "POWDIRON" parts can be produced in a variety of compositions—with or without lubricant-retaining features—to meet different engineering requirements. All are characterized by the same ready-to-assemble dimensional accuracy that keeps costs down on the production line.

Information on "COMPO" and "POWDIRON" bearings and parts for specific applications may be obtained from Bound Brook Oil-Less Bearing Company, Bound Brook, N. J.

CONTINENTAL SCREW COMPANY
INC. ★ 1904

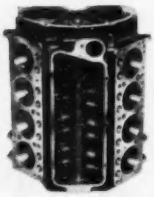
You can count on Continental

CONTINENTAL SCREW COMPANY
New Bedford, Mass.

Manufacturers of famous HOLTITE-Phillips and Slotted Head Screws and Bolts and Allied Fastenings, both Special and Standard

HOLTITE *Engineered* FASTENINGS

Performs 180 operations in 43.5 seconds. Drills, spot-drills, rough-bores, c'bores, c'sinks, and reams. Includes 360° rotating fixture for removal of chips at station No. 11, and automatic gauge of drilled holes at station No. 17.



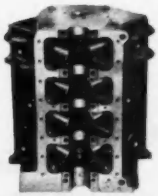
Capacity!

80!

CYLINDER BLOCKS AN HOUR

379!

OPERATIONS



GREENLEE

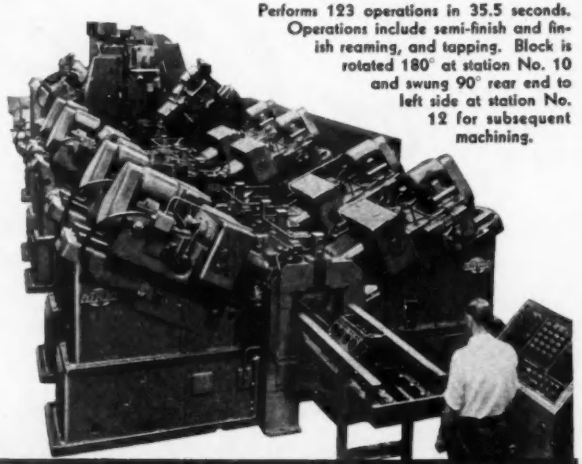
TRANSFER MACHINES

When you see one of these big Greenlee transfer machines working — turning out a tremendous quantity of work so smoothly and easily — you realize the qualities that make them great. Here is power, precision, durability, and a vast multiplicity of operations in a compact, integrated unit. Here is modern mass-production in its most successful form.

Greenlee's pioneering experience, added to years of accumulated skill, has created an organization that can successfully and repeatedly produce these outstanding machines.

Performs 76 operations in 43.8 seconds. Drills, c'sinks, c'bores, and trepans. Tilts part at station No. 1 to 180° for subsequent machining. Automatically gauges and cleans drilled holes at station No. 20.

Performs 123 operations in 35.5 seconds. Operations include semi-finish and finish reaming, and tapping. Block is rotated 180° at station No. 10 and swung 90° rear end to left side at station No. 12 for subsequent machining.



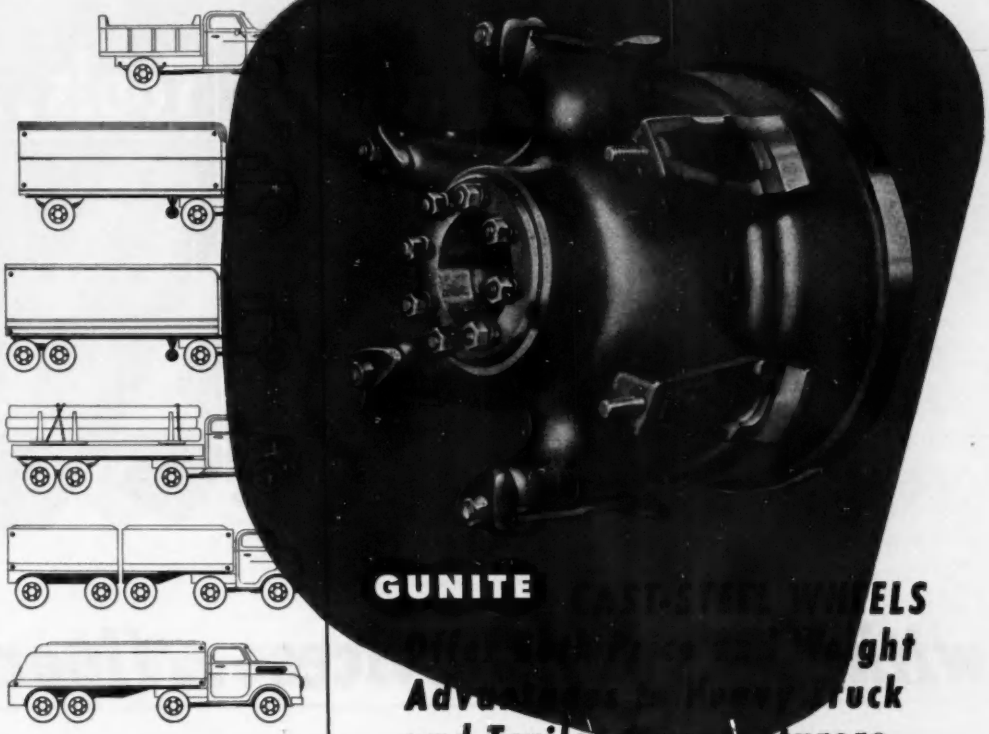
PRODUCTION MACHINERY

GREENLEE

GREENLEE BROS. & CO. 1760 MASON AVE., ROCKFORD, ILL.

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

GUNITE WHEELS MAKE GOOD TRUCKS BETTER



GUNITE

...ELS
...ght
Adv... ...ruck
and Trailer Manufacturers

Many engineers are specifying Gunite Cast-Steel Wheel Assemblies on their heavier trucks and trailers. They gain all these advantages:

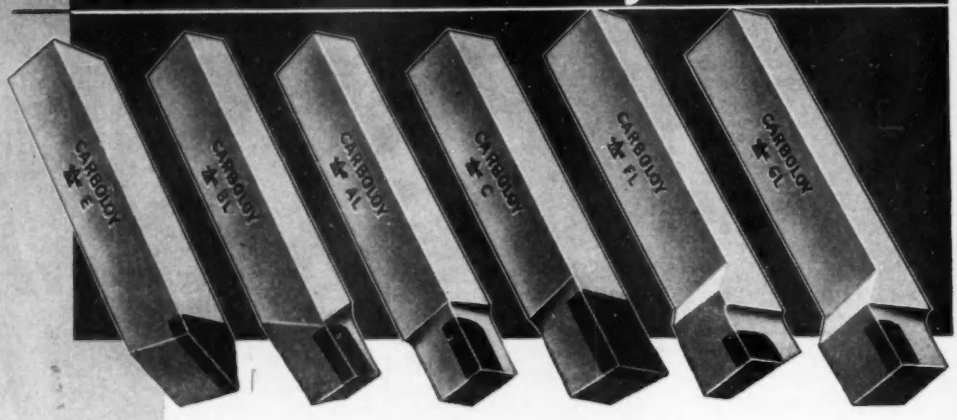
1. Minimum weight with maximum strength
2. Better appearance
3. Floating rim bolt for easy replacement
4. Increased safety of famous Gunite Brake Drum
5. Greater air-cooling over brake drums
6. Easier Assembly . . . less weight to handle

Write for Complete Engineering Data

GUNITE FOUNDRIES CORPORATION

Boost Production

with Standard Carboloy Tools...



with Carboloy Services... *finer*

An all-inclusive service program . . . to help you get the greatest possible benefit of performance and savings from Carboloy Cemented Carbides. Covers everything! Tool design . . . all phases of use, maintenance of carbide tools . . . practical tips on tool conservation, increased productivity.

Specific services and material include advice and assistance from skilled Carboloy engineers and technicians. A Customer Training School in Detroit for your key men (tuition-free). Slide Films (at approximate print cost) for your in-plant use. Technical Literature. Catalogs. Manuals. Charts. Everything you need to help select, design, fabricate, use and maintain carbide tools. New technical training literature for defense production, too.

Also, to increase the all-around efficiency of carbides in your plant, the Carboloy Plan of Coordinated Carbide Control . . . the famous "Triple C" Plan adopted and proved by hundreds of manufacturers.

Write, wire or phone Carboloy organization today for information about this outstanding Carboloy Service Program. Or contact your local Carboloy Sales Engineer or Authorized Distributor.

Specify CARBOLOY®

CEMENTED CARBIDE

Lower Costs...

fewer tools to do more jobs

No need to stock a heavy, costly inventory of special carbide tools... not when you use Standard Carboloy Tools. Only 11 styles are needed to do 4 out of 5 of your single-point tool machining applications. Whatever the job, whatever the material, chances are that one of these versatile Standard Carboloy Tools is adaptable.

Standard Carboloy Tools cost less than many high-speed steel tools, too, outlast them as much as 10 to 1. Wherever they're used, production goes up, tool costs go down. And savings in tool maintenance, down-time and tool replacement really add up.

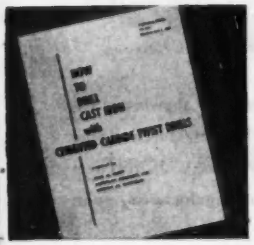
Over 14 million of these *uniform* high-quality Standard Carboloy Tools have been setting records throughout industry. Doing tough production jobs faster, better, cheaper.

Standard Carboloy Tools in the most commonly used sizes are available from your local authorized Carboloy distributor. The Carboloy organization is the world's oldest and largest producer of cemented carbides.

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY
11151 E. 8 MILE AVE. • DETROIT 32, MICHIGAN

"Carboloy" is the trademark for the products of Carboloy Department of General Electric Company.

aids to extra performance



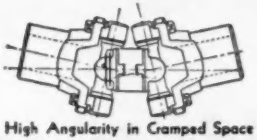
FOUR IN-PLANT CARBIDE AIDS. Part of the comprehensive Carboloy Service Program (left) to help you to new highs in production and savings through most effective use of cemented carbides. Program, illustrated above, left to right, includes: (1) Technical data on how to drill Cast Iron with Carbide Twist Drills, (2) Famous Carboloy "Triple C" Plan, (3) Cemented Carbide Data for Defense Production, for shell contractors only, and (4) Slide Films for training in carbides. All services free, with exception of slide films, which are yours at approximate print cost. Write today.

STANDARD TOOLS

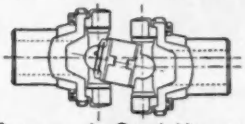
THE QUALITY BRAND

if ANGULARITY is your problem

MECHANICS close-coupled type Roller Bearing UNIVERSAL JOINTS are specially designed for operation within cramped quarters, and where shafts are out of alignment — as in rear engine cars, trucks and busses. Let our engineers show you how these MECHANICS joints will conserve space and compensate for offset shafts, in your new models. These joints fit into spaces that engineers formerly considered too short for universal joints.



High Angularity in Cramped Space



Compensates for Out of Alignment

Our new catalog — showing complete line of MECHANICS Roller Bearing UNIVERSAL JOINTS — will be sent to manufacturers, upon request.

MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner

2024 Harrison Ave., Rockford, Ill.

Strip Steels

with the

Superior Plus

Specialized **Research** There's just one objective for Superior research: better strip steels for the customer! The results of keeping to this specialized subject are to be found in every coil of every grade of strip we manufacture . . . *continuously Superior.*

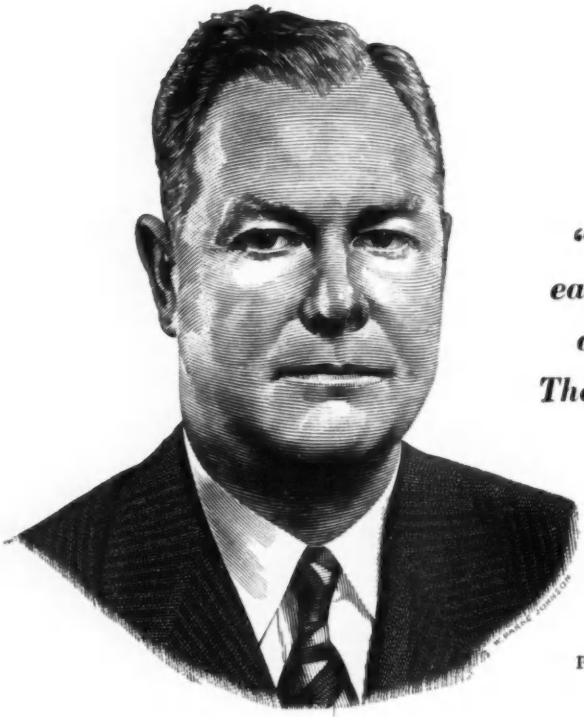
Specialized **Production** Superior's plant facilities are organized exclusively for the production of strip steels. Men, machines and methods are correlated with over 50 years' *know-how*—keeping Superior strip steels consistently in the lead for quality of performance in the metal-working industries.

Specialized **Service** Specializing in strip steels, Superior gives you a big "plus" in service, too—a wide range of grades for easy selection—the exact finishes and tempers you desire—strict attention to detail in packaging and shipping—complete cooperation on your fabrication questions.

Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA

Specialized **Superior Strip Steels:**

HOT ROLLED—COLD ROLLED . . . STAINLESS STEELS OF ALL ANALYSES . . . SUVENEER® COPPER, MONEL, AND NICKEL CLAD METALS . . . ALLOYS, SPRING STEELS, AND SPECIALTIES



"... Nearly nine out of each ten of our employees are ... participating in The Payroll Savings Plan."

E. J. HANLEY

President, Allegheny Ludlum Steel Corporation

"Systematic Savings offer the surest means of future security and we know of no better systematic savings plan than that afforded by payroll deduction purchases of U. S. Defense Bonds. Nearly nine out of each ten of our employees are helping their country while they save by participating in this plan."

There are three easily understood reasons why 88% of Allegheny Ludlum's 14,378 employees are enrolled in the Payroll Savings Plan:

- the recognition by Mr. Hanley and his associates of the Payroll Savings Plan as a major contribution to America's Defense effort . . . an important, stabilizing factor in our national economy . . . a road to personal security for Allegheny Ludlum employees.

- Allegheny Ludlum's person-to-person canvass of employees, which put an application blank for the Payroll Savings Plan in the hands of every man and woman on the company payroll.

- the patriotism and sound sense of the Allegheny Ludlum employees who know that every dollar they invest *each month* in U. S. Defense Bonds is a double duty dollar—it helps to keep America strong . . . it builds personal security for the employee.

If employee participation in *your* Payroll Savings Plan is less than 50% . . . or if you are one of the relatively few industrial companies that does not have a Payroll Savings Plan, phone, wire or write *today* to Savings Bond Division, U. S. Treasury Department, Suite 700, Washington Building, Washington, D. C. You will get all the assistance you may need to place your company among the thousands of companies that have 60, 70, 80%, even 88% participation in the Plan That Protects.

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Sealing around rotating shaft having angular movement

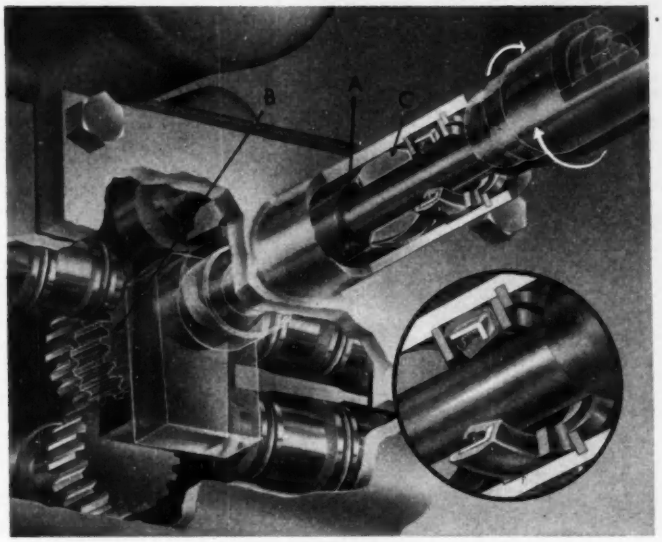

Figure 1
Cut-away of portion of Gemmer HYDRAGUIDE showing location of Syntech oil seal and angular movement of steering shaft.

Rotating shafts using spherical bearings to permit a planned angular movement or self-alignment, require special performance capabilities in the oil seals. A striking example is found in HYDRAGUIDE, the new Gemmer power steering gear, where the steering shaft makes an angular movement of as much as 38° each side of center to actuate the hydraulic valves in the mechanism.

In the cut-away drawing (Fig. 1) the shaft (A) is connected through a rubber universal to the steering post. As the steering wheel is turned, the spur gear (B) tends to rotate around the mating gear. This results in an angular movement of the shaft permitted by the spherical bearing located at (C) in the drawing. Adjacent to this bearing, a National Syntech† stock design 350,000 series, rubber-covered, spring-tensioned oil seal (Fig. 2) is employed.* This seal is sufficiently flexible to follow the lateral movement of the shaft and still provide dependable protection for the bearing and other internal mechanical parts.

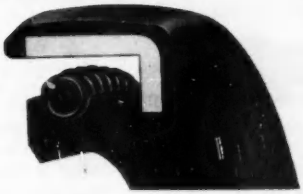

Figure 2
Modified National 350,000 series Syntech oil seal as used in the Gemmer HYDRAGUIDE.

Gemmer's adoption of this stock design National Seal is a tribute to the inherent performance capabilities which it possesses. The sealing lip, with carefully designed flex section, is well known for its ability to provide zero leakage performance under certain conditions of shaft-whip, run-out misalignment and pressure. The rubber covering on the O.D. of the seal provides a perfect seal at the outer periphery.

Figure 3
National Convoluted Flex type Syntech seal.

Where shaft eccentricities are extreme, special oil seals are available. Typical example is the National Convoluted Flex type seal (Fig. 3) employing extra spring-tensioning and an extra long lip design which can follow shaft displacements of as much as ⅛ inch.

National Oil Seal engineers have had experience with a wide variety of sealing problems. This experience is yours for the asking. Perhaps you have a sealing problem that can be solved with one of our stock designs, or perhaps a new design is required. In either case, we will be glad to help you.

"Let Your Decision be Based on Precision"

NATIONAL OIL AND FLUID SEALS

NATIONAL MOTOR BEARING CO., INC.
General Offices: Redwood City, California
Plants: Redwood City, Calif.; Downey (Los Angeles County), Calif.; Van Wert Ohio

2276

**Elsewhere in this mechanism three other stock design National 240,000 series Syntech springless type oil seals are employed as well as a total of 25 "O" Rings which are utilized on the hydraulic pistons and as gaskets.*

† Trade mark registered.

CALL IN A NATIONAL ENGINEER FOR RECOMMENDATIONS

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DETROIT, MICH. . . . . 726 Lothrop Avenue, Trinity 1-6363
DOWNEY (Los Angeles Co.), CALIF. . 11634 Patten Rd., Topax 2-8166
MILWAUKEE, WIS. . . 647 West Virginia Street, Broadway 1-3234
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PHILADELPHIA, PA. . . 401 North Broad Street, Bell-Walnut 2-6997
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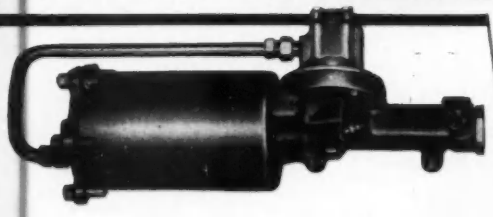
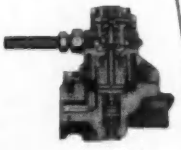
MIDLAND AIR HY-POWER

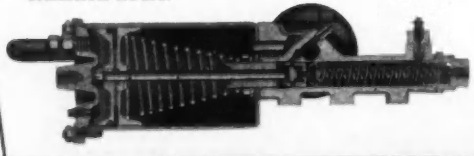
STANDARD on Army Ordnance Eager Beaver 6x6 Vehicles



Midland Air Hy-Power, compact and completely self contained, can be located as a single device at any available place on the chassis without moving the master cylinder, and using the original equipment brake pedal.

Is used to replace foot control valve and power chamber cluster — also supplied in complete truck or tractor air brake kits saving from 5 to 7 valuable installation hours.





Air Over Hydraulic in its Simplest Form

Midland Air Hy-Power is lightning fast, assuring greater efficiency, adds extra margin of safety and provides "passenger car" brake graduation and "pedal feel."

Selected and now being installed on thousands of Ordnance 6x6 trucks as standard equipment, after long rigid tests by leading manufacturers.

Midland Air Hy-Power combines into one unit, three long used and thoroughly proven units, all sealed against atmospheric conditions.

Midland *Air* Hy-Power embodies the same principle of design as Midland *Vacuum* Hy-Power now in its 7th year. Call your Midland Distributor for literature and prices.

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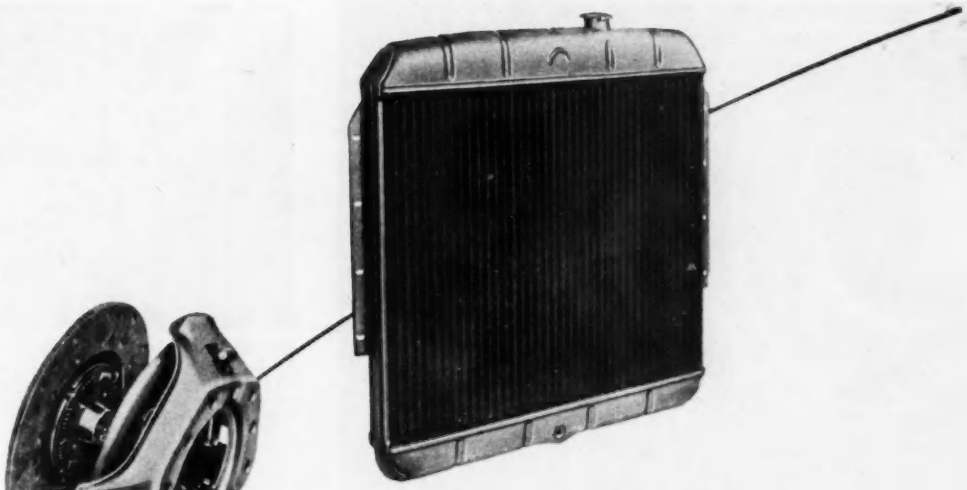
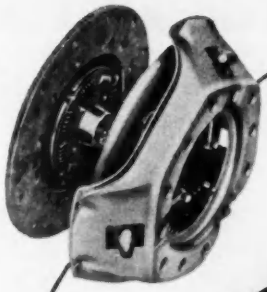
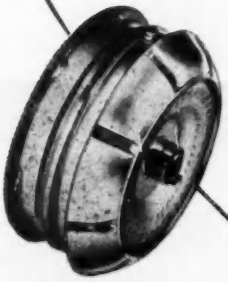


Versatility





We've been a part of the automotive industry since its start. A half-century of production has given us our share of experience.

Our engineers have the ability and vision to "see" the answers to design problems. Our manufacturing flexibility permits quick translation of these answers into finished units.

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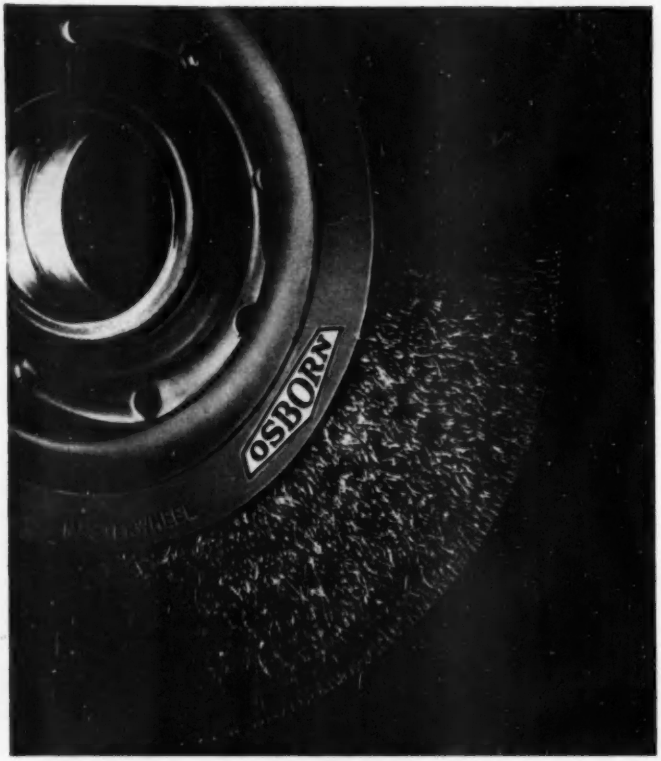

Multiply your manpower with these new steel muscles

Thousands of plants are discovering how to lick manpower problems with new Osborn Brushing techniques. Let's find out how they can help *you!*

Machine-powered Osborn brushes are removing burrs from threads and other parts 3 to 10 times faster than former hand methods. They are doing product cleaning, finishing and many other operations in a matter of seconds. They release skilled manpower for other work and cut rejects to the minimum.

Whether your product is metal, rubber, plastic or fabric, it will pay you to call in the **O**sborn **B**rushing **A**nalyst to study your cleaning, deburring and finishing operations. He will recommend improvements with the latest Osborn power brushing techniques. Call or write *The Osborn Manufacturing Co., Dept. 551, 5401 Hamilton Ave., Cleveland 14, O.*

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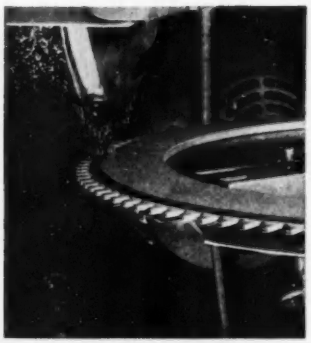
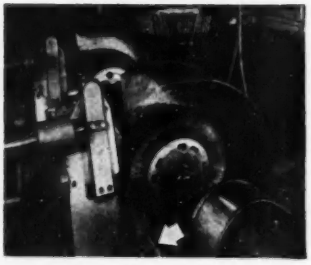
LOOK FOR THE NAME OSBORN . . . RECOGNIZED EVERYWHERE FOR QUALITY WORKMANSHIP AND MATERIALS



DEBURRING OUTPUT TRIPLED. That's the production increase in this plant using Osborn Power Brushing for the removal of burrs from clutch discs. And quality of finish is greatly improved.



FINISHING OUTPUT UP 20%. Osborn Power Brushing removes heat-treat discolorations and surface imperfections of these shafts prior to plating. Cut number of passes from two to one, increasing output 20%.

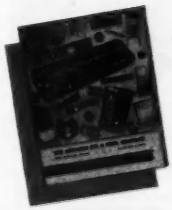
THIS IS "OSBORN". Our engineers . . . in the field and at the factory . . . have a vast fund of experience to help solve your cleaning and finishing problems. When you buy brushes with the name "OSBORN" you can be sure you are getting tools for unsurpassed production *results!*

Depth Bomb part drawn with Advance Dies from 31½" steel blank.

THIS DIFFICULT STAMPING SIMPLIFIED BY NEW ADVANCE TOOLING METHOD

Here's another example of ADVANCE tooling ingenuity. The problem: This depth bomb tail piece deep-drawn to the dimensions shown above . . . in just two draws . . . from a 14-gauge steel blank. Similar pieces were formerly produced with five or six draws, or by butt-welding two halves.

Advance tooling techniques met the requirements — with dies that produced the part in two draws as specified. Advance can help you with your difficult drawing and stamping problems . . . and save you time and money in your processing operations. Our engineers and our completely equipped die plant are ready to serve you. Consult us — or write for complete information.



Write for Illustrated Descriptive Bulletin

ADVANCE DIE & TOOL CO.

6800 MADISON AVENUE — CLEVELAND 2, OHIO

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Ever see such a fast-moving assembly line?

It is amazing how fast the automotive industry has moved.

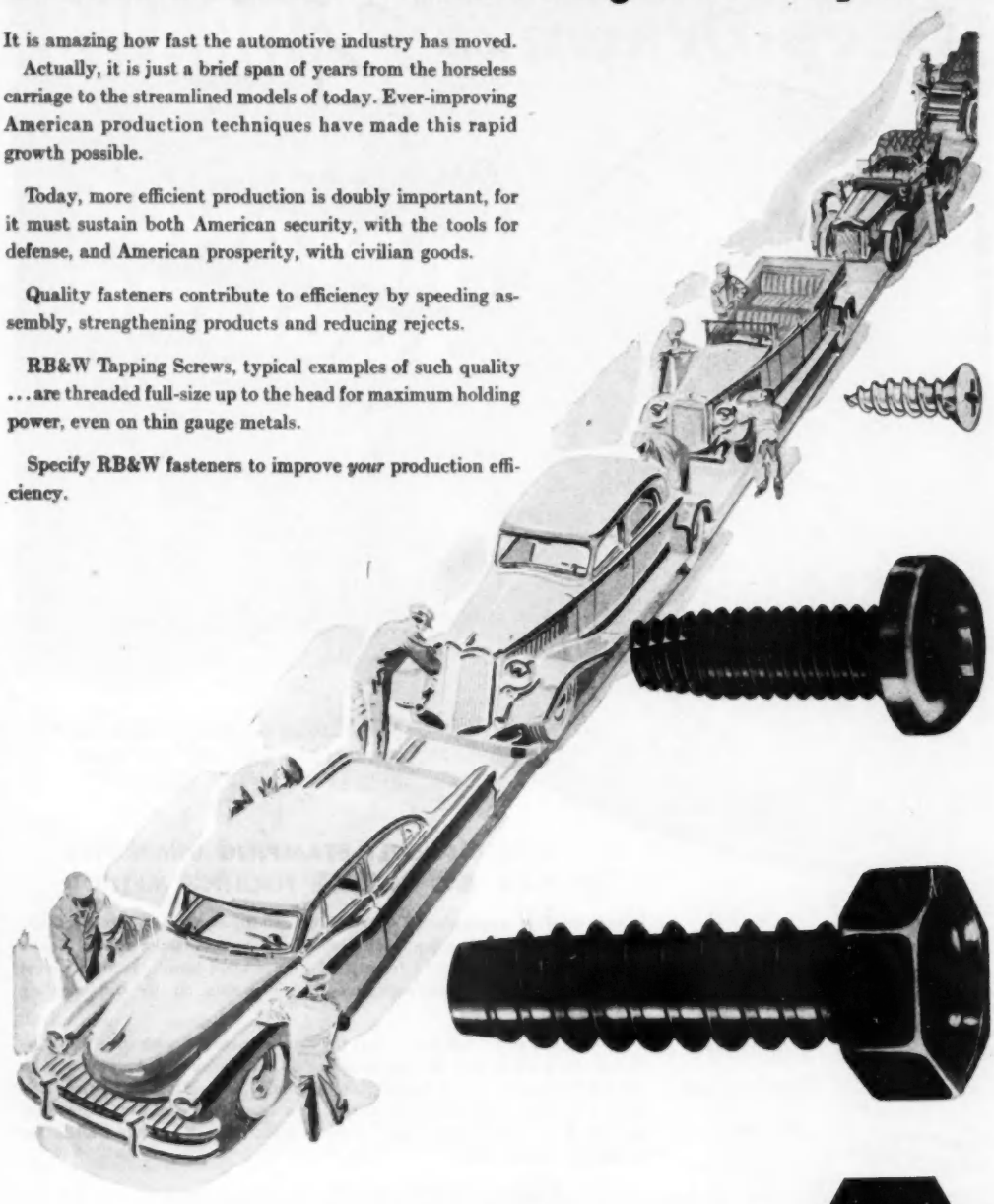
Actually, it is just a brief span of years from the horseless carriage to the streamlined models of today. Ever-improving American production techniques have made this rapid growth possible.

Today, more efficient production is doubly important, for it must sustain both American security, with the tools for defense, and American prosperity, with civilian goods.

Quality fasteners contribute to efficiency by speeding assembly, strengthening products and reducing rejects.

RB&W Tapping Screws, typical examples of such quality ... are threaded full-size up to the head for maximum holding power, even on thin gauge metals.

Specify RB&W fasteners to improve *your* production efficiency.



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RB&W
THE COMPLETE QUALITY LINE

Plants at: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill., Los Angeles, Calif. Additional sales offices at: Philadelphia, Detroit, Chicago, Dallas, Oakland. Sales agents at: Portland, Seattle.

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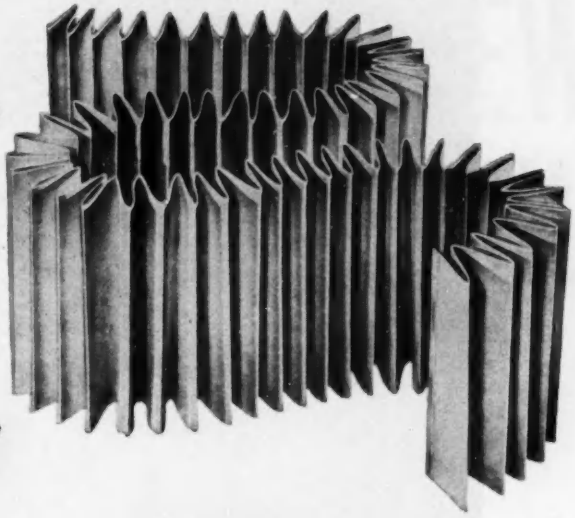

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Extra Filter Area. Purolator gives up to 10 times the filtering area of old style filters . . . gives longer, more efficient action.

Extra Efficiency. Purolator traps an average of 290% more abrasives than ordinary filters, holds back particles so small they're measured in microns (.000039").

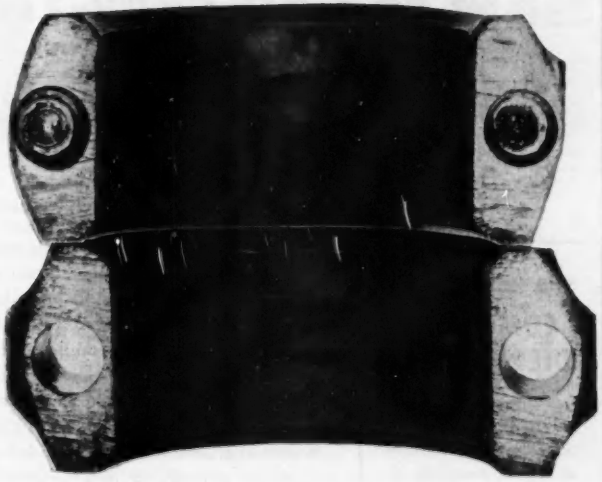
All this—plus freedom from warping and disintegrating—plus the fact the Purolator* Micronic refill leaves oil additives in—is why more and more automotive and engine manufacturers are offering the Purolator Micronic* as standard equipment.

Actually, this builds business and good will for car dealers . . . because the Purolator Micronic is a recognized quality accessory . . . because it saves service time, helps sell motorists on service.

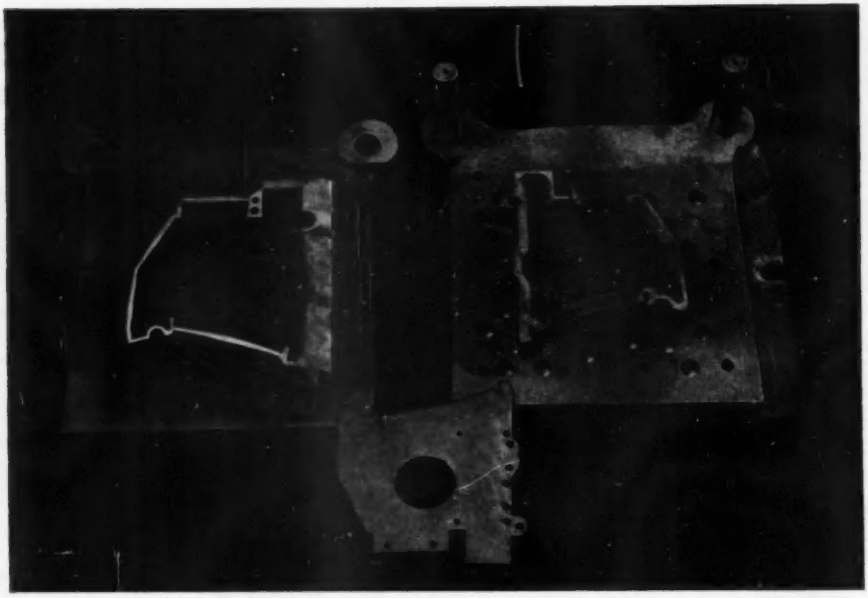
Finally, the presence of a Purolator is proof that the manufacturer is proud of his product, wants to assure trouble-free performance.

Whatever your filtering problem . . . remember, Purolator's engineering staff is at your service.

PUROLATOR PRODUCTS, INC.
Rahway, New Jersey and Toronto, Ontario, Canada
Factory branch offices: Chicago, Detroit, Los Angeles
*Reg. U. S. Pat. Off.



PUROLATOR
MICRONIC OIL FILTER
"FIRST IN THE FIELD OF FILTERING"



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COMPOSITE DIE SECTIONS

Contains complete data on 35 Standard Die Sections, from combinations of which thousands of die shapes can be made —also full information on Special Die Sections, and how to order.

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You can save steel and time in the making of dies for blanking, trimming, beading, or any application involving the cutting of sheet metals to regular or irregular shapes, by assembling them from FCC Composite Steel Die Sections.

These prefabricated die parts consist of fine tool steel cutting edges, in a selection of grades, electrically welded by a special process to non-hardenable mild steel bases. Thus, screw and dowel holes may be easily drilled after heat treating, and there are numerous other advantages that will be immediately obvious to the die maker.

Thousands of die shapes may be made up from combinations of thirty-five standard sections. Specially shaped sections are manufactured to customers' specifications in five to ten days.

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*for Long Mileage!
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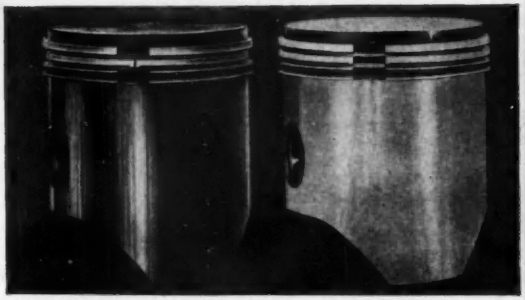


CLEAN PISTON at right shows how NEW Sunoco Dynalube keeps rings free-acting . . . keeps combustion chamber deposits to a minimum. Fouled piston with stuck rings, at left, resulted from use of inferior motor oils. To prolong engine life . . . assure top performance . . . recommend NEW Sunoco Dynalube.

NEW Premium Heavy-Duty Sunoco Dynalube is one of the very few motor oils that meet or exceed manufacturers' recommendations for all 1951 passenger cars

Compare with *any* other motor oil these features listed on every can of NEW Dynalube:

1. Tough **Heat-Resistant Body** assures long motor oil mileage.

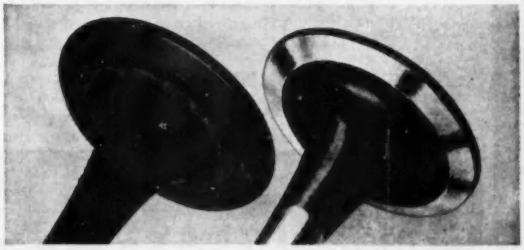
2. Fully **Detergent-Dispersant** — NEW Sunoco Dynalube cleans engines and keeps them clean. Road dust and contamination from normal combustion are held in practically harmless suspension until oil is drained at the regular interval. (For maximum protection we recommend a complete oil change every 1000 miles.)

3. Free-Flowing and **Metal-Clinging** qualities of NEW Sunoco Dynalube prolong engine life.

4. Anti-Rust and **Anti-Acid** — NEW Sunoco Dynalube counteracts two of the greatest causes of wear in the vital combustion chamber areas of any engine.

5. High **Film Strength** and **Ring-Sealing Action**— insure longer-lasting engine efficiency.

NEW Premium Heavy-Duty Motor Oil Combines in a Single Oil *All* the Finest Features of America's Premium Motor Oils . . . Actually *Improves* the Condition of Most Engines.



LAB FINDINGS. Valve on left shows heavy deposits resulting from use of inferior oils—a common cause of sluggish action and poor valve seating. Clean valve on right shows how NEW Sunoco Dynalube helps engines stay remarkably clean . . . keeps valves free-acting . . . maintains full engine power. **HYDRAULIC VALVE LIFTERS, in particular, need the *extra* detergent-cleansing protection of this new heavy-duty premium motor oil . . . another important reason why motorists owning cars equipped with hydraulic valve lifters should change to NEW Dynalube.**

***Memo to AUTO ENGINEERS:** *After* road-testing New Dynalube and stripping down engines, the American Automobile Association certified these lab findings: "complete absence of injurious varnish or sludge"..."all piston rings were free and clean"..."no carbon built up on underside of valves"..."complete absence of rust on cylinder bores and other moving parts."

The Crankshaft

—backbone of the internal combustion engine.

Modern Trends—more r.p.m.'s, higher compression ratios, more power per cubic inch of displacement—all lend additional emphasis to the importance of crankshaft quality.

Wyman-Gordon Experience—the most extensive in the industry, assures the maximum in physical properties, uniform machinability, and balance control.

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"IF IT TURNS, BALANCE IT"!
"BEAR" DY-NAMIC BALANCING

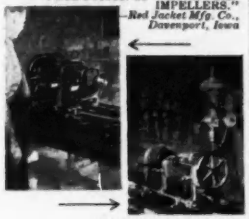
...is faster, simpler, with low initial cost!

DY-NAMIC BALANCING USERS REPORT RESULTS LIKE THESE!

"MOTORS WITH DY-NAMICALLY BALANCED ROTATING PARTS HAVE FEWER MECHANICAL FAILURES."
—*Electrical Maintenance Co., Boston, Mass.*

"PHENOMENAL REDUCTION IN SOIL PIPE REJECTS AFTER MOLDS WERE DY-NAMICALLY BALANCED."
—*Central Foundry Co., Holt, Ala.*

"DY-NAMIC BALANCING INCREASES PRODUCTION OF WATER PUMP IMPELLERS."
—*Red Jacket Mfg. Co., Davenport, Iowa*



"DY-NAMIC BALANCING ELIMINATES NOISE IN 'V' GROOVE PULLEYS!"
—*Lennox Furnace Co., Marshalltown, Iowa*

These excerpts are from the recent BUSINESS WEEK article, entitled "If It Turns, Balance It".
"Uneven weight distribution on a rotating part creates forces that are bigger than you think: A 1-oz. weight on a string 1 in. long spun at 50,000 rpm. develops a force of more than 2 tons acting at the end of the string."
"If you balance a part at the start, you don't have to tear down the whole machine after assembly to locate a thump."
"Actually, most revolving objects have both Static and Dy-Namic unbalance."
PRODUCTION
"Results from systematic balancing are sometimes phenomenal. A foundry in Alabama making centrifugally-cast soil pipe, found 26% of the pipe had to be rejected because of imperfections. The molds used were balanced—and rejections were cut almost to zero."
If It Turns, Balance It

DID YOU KNOW•••
these facts about
DY-NAMIC BALANCING?

¶ Static Balancing alone, without Dy-Namic Balancing, often causes more harm than good!

•••

¶ Castings and forgings aren't always machined on all faces. Even when they are, it may not be practical to machine to close tolerances. Consequently, the casting may not be precisely concentric ... RESULT: DY-NAMIC UN-BALANCE!

•••

¶ Despite careful machining, the metal in a rotating part is not always homogeneous ... RESULT: DY-NAMIC UN-BALANCE!

•••

¶ Some objects, such as the windings on a small electric motor, simply can't help being nonsymmetrical ... RESULT: DY-NAMIC UN-BALANCE!

•••

¶ Tolerances which are allowed in the machining or assembly of rotating parts can produce DY-NAMIC UN-BALANCE!

Throughout Industry, "Bear" Dy-Namic Balancing is making its weight felt more than ever before. Leading car manufacturers and engine builders now use Dy-Namic Balancing for products they manufacture as well as for proper maintenance of their own machines. By so doing, they increase overall life of rotating parts and eliminate noise and vibration. They find the "Bear" Method a practical way to balance parts at production line speeds with low initial cost.

The speed and simplicity of "Bear" Machines solve the operator training problem—most shop personnel can master the operation of "Bear" Balancers with a few hours' practice. Accuracy is not sacrificed for simplicity—to the contrary, the new "Bear" Balancers possess extreme sensitivity that assures hair-splitting accuracy in all balancing operations.

"Bear" Dy-Namic Balancers are available to handle a wide range of sizes and weights, from the tiniest armature to the largest diesel crankshaft. Your free Dy-Namic Balancing Manual describes and illustrates the many models. It shows you how you can save on production and maintenance costs, add more value, more sales appeal and competitive advantages to your product. Mail the coupon or write TODAY!

509A1

"BEAR"
Trade Mark Reg. U. S. Pat. Off.
STATIC AND *DY-NAMIC BALANCING* MACHINES

FREE 24-page ILLUSTRATED DY-NAMIC BALANCING MANUAL

...replete with diagrams, illustrations, actual application photographs, Dy-Namic Balancing tables and charts.

Tells How Dy-Namic Balancing

••• REDUCES NOISE, VIBRATION and FRICTION which are the main causes of MECHANICAL FAILURES!

••• CAN BE INSTALLED AT LOW ORIGINAL INVESTMENT—a machine that will balance most small rotating parts can be obtained for an investment of $538.00. Other "Bear" Machines priced proportionately.

••• ATTAINS STATIC and DY-NAMIC BALANCE in one operation!

••• IS EASILY ADAPTED to your production or maintenance operations.

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Without cost or obligation, please send me a copy of your 24-page illustrated DY-NAMIC BALANCING MANUAL.

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(Please write your name, company name & address in margin.)

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Lusterless, semi-gloss and gloss lacquers, enamels; undercoats and thinners to meet virtually all U. S. Government Specifications

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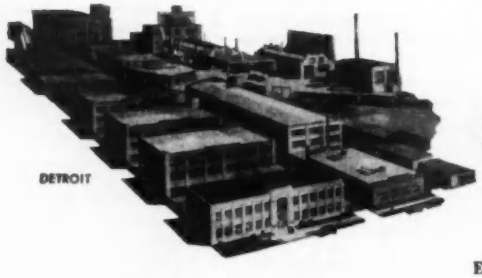
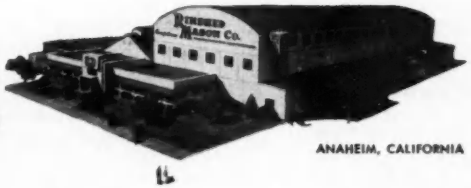


DETROIT



ANAHEIM, CALIFORNIA

Illustrated above are Rinshed-Mason's 37 building units at Detroit and Anaheim, California, consisting of office, factory and laboratory facilities. Not shown are field exposure test facilities at Miami, Florida.

Established in 1919, Rinshed-Mason is one of America's leading manufacturers of fine quality lacquers, enamels and undercoats for automobiles, farm equipment, appliances, and numerous other peacetime industrial products. Beyond this, versatile laboratory and production facilities are available to meet defense requirements for protective and other coatings.

Rinshed-Mason Co.

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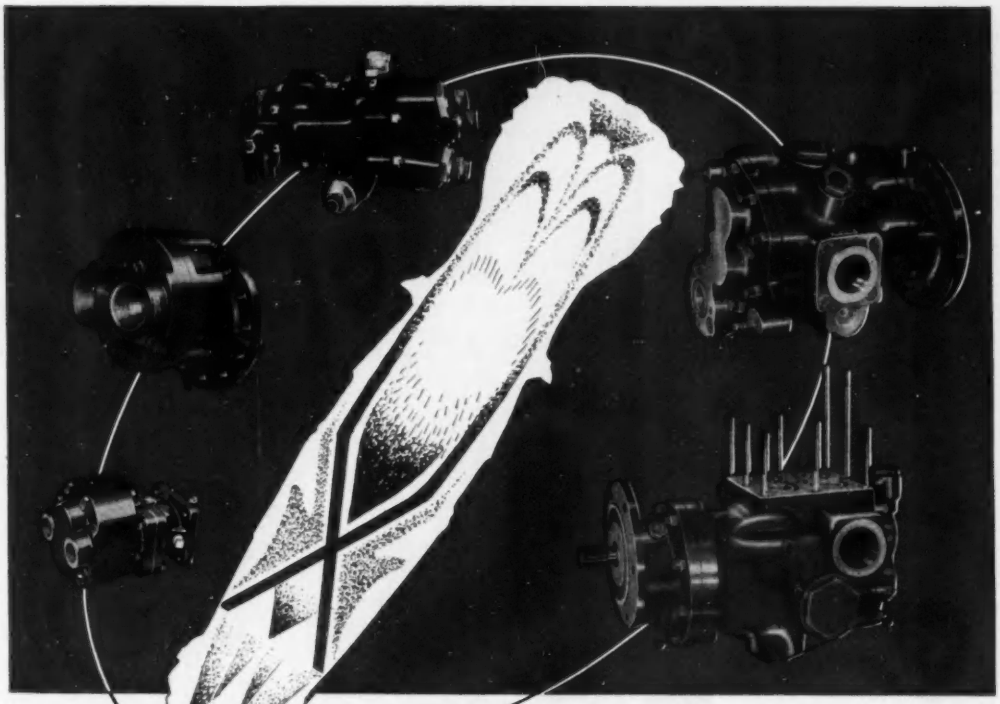
DETROIT 10, MICH.

R-M
REG. U.S. PAT. OFF.

1244 N. LEMON ST.
ANAHEIM, CALIF.



EVERY American Jet engine flying today is equipped with PESCO Fuel Pumps

Ever since the emergency call came in 1941 for a failure-proof fuel pump that would stand up and deliver fuel to jet engines under conditions never before encountered, Pesco has paced the industry in the development of high-pressure fuel pumps.

Pesco designed and built the first fuel pump for the first American-built jet engine, and since then new models have come from Pesco engineering laboratories in rapid succession to meet the fast-changing and exacting demands of the military.

Today, every American jet engine in the air is equipped with Pesco fuel pumps. A few representative models are shown above. They range from the first simple, single element pump that produced 275 gph at 100 psi, to today's double element (main and emergency pump in a single housing) pump that delivers nearly 2000 gph at 1200 psi.

Setting the pace for jet engine fuel pump development is only one of Pesco's important contributions to safer, faster, more dependable aircraft. It is experience that can be of real help to you.

Why not call Pesco today.

engineering Pesco production

PRODUCTS DIVISION

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dependable hardenability with maximum properties in low alloy boron steels

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For boron-treated steels, whether made in the electric furnace or in the open hearth, Grainal alloys are used successfully to increase hardenability.

A larger quantity of Grainal is usually required in electric furnace practice because of the higher nitrogen content characteristic of steels produced by this method. The conversion of the nitrogen content of the steel to an ineffective compound, as is done by some of the components of Grainal, permits a minimum amount of boron to produce the desired effects.

Grainal alloys are metallurgically balanced so that the larger additions required by electric furnace steels can be made safely without exceeding the boron limit for hot shortness.

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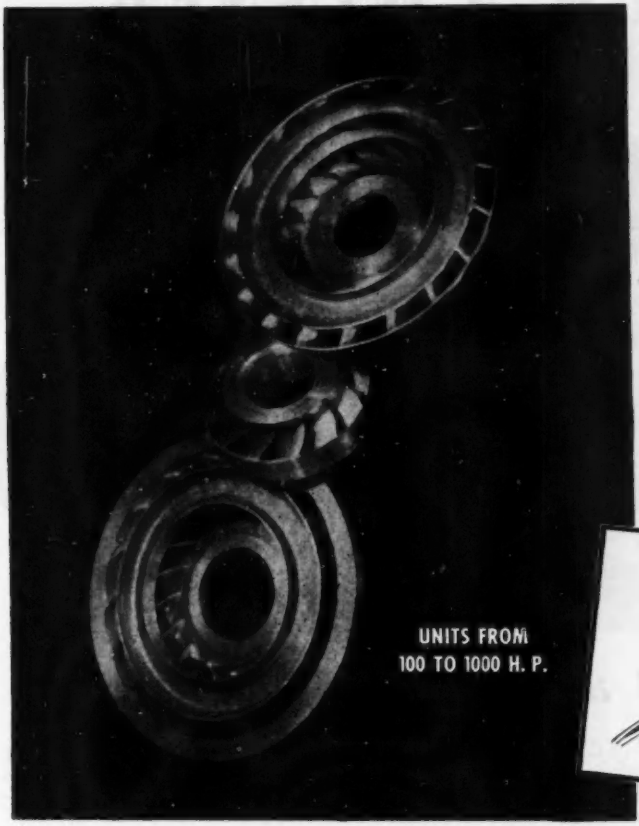

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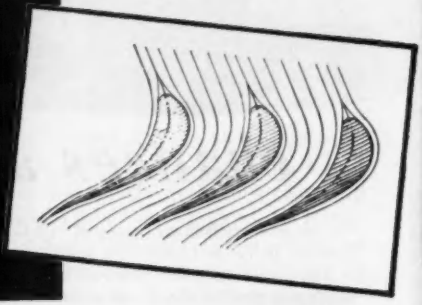

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Companies licensed under the Schneider System include:

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Pioneers of torque converters in America, Schneider today is producing dependable hydraulic torque converters that are characterized by their simplicity and economy. These units are used in busses, trucks, tractors, and industrial application.

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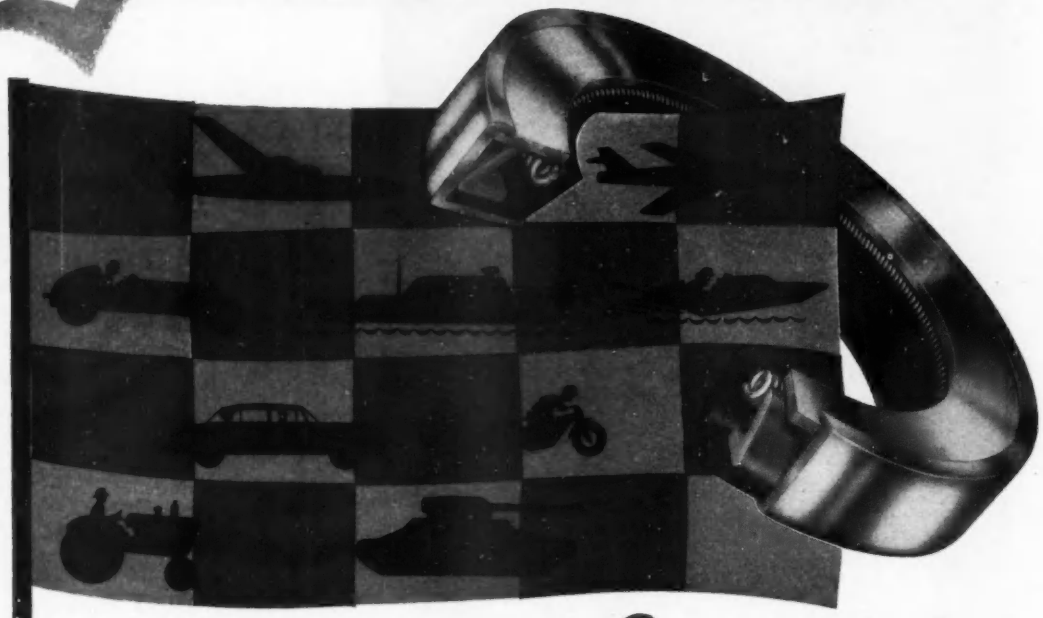

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Winners in every field are protected with C/R Oil Seals. The cars, planes and boats "out front" demand perfect oil and grease retention, absolute bearing protection. That's why you'll find more motor vehicles, farm implements and industrial machines equipped with C/R Oil Seals than with any other shaft-type sealing device.

Behind this universal acceptance of C/R Oil Seals is a record of complete product reliability and a long-standing practice of "cooperative" engineering. In other words, when you have a tough fluid sealing or dirt exclusion problem, Chicago Rawhide engineers will work hand in hand with you to see that you find the "Perfect," dependable answer.

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The result of 30 years' pioneering to solve difficult sealing problems is a vast assortment of types and sizes to suit the most critical demands of quality and performance. Today, in addition to specially developed seals for unusual applications, you may choose from 15 standard types and 1800 sizes.

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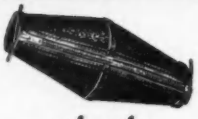
1310 Elston Avenue **OIL SEAL DIVISION** Chicago 22, Illinois



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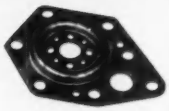
Boots, diaphragms, packings and other products give dependable service under difficult operating conditions.



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The Scientific Compounded Elastomer

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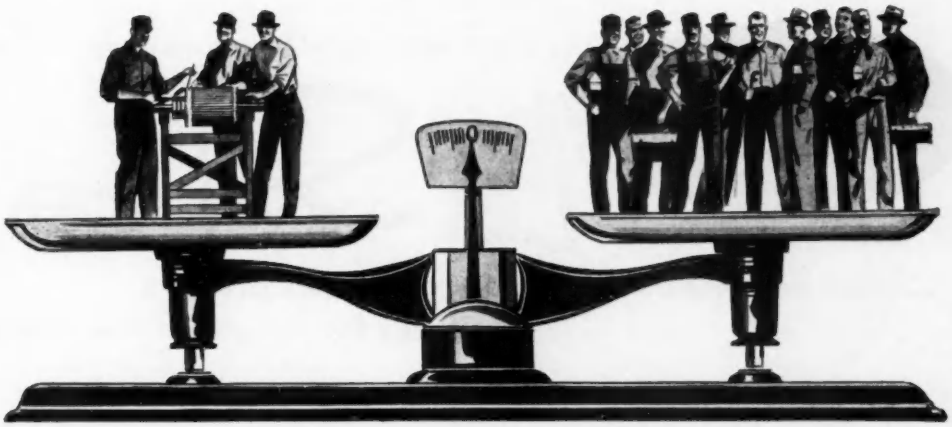

$370 INVESTED IN SILICONE INSULATION SAVES $80,000 IN MAN-HOURS ALONE

TRAVELLING CRANE MOTORS insulated with Class B materials had a normal life expectancy of only 20 days in a large southern foundry. At least 2½ to 3 hours were required to change motors. Down-time cost $1000 an hour in lost man-hours or $2500 for each failure. That amounts to over $40,000 a year in lost man-hours alone.

OVER TWO YEARS AGO, three crane motors, rated at 15, 30 and 50 hp, were rewound with Silicone (Class H) materials at an additional cost of about $370.00. Still in service, those Class H motors have already saved $80,000 in labor plus the cost of rewinding with Class B materials plus the value of lost production.

THAT'S TYPICAL of the performance of motors protected with Class H insulation made with Dow Corning silicones. They last at least 10 times longer than the next best class of motors. They also have at least 10 times as much wet insulation resistance. That's why more and more military and industrial engineers are demanding Class H equipment. That's why more and more design engineers are specifying Class H equipment. And that's why Class H is becoming more readily available from motor manufacturers and rewind shops.

WRITE, RIGHT AWAY

to DOW CORNING CORPORATION, MIDLAND, MICHIGAN

Please send me
- ☐ List of Class H Motor Manufacturers (C-10A)
- ☐ List of Class H Rewind Shops (C-10B)

Name_____

Title or Dept._____

Company_____

Address_____

City_____ Zone_____ State_____

FIRST IN SILICONES

DOW CORNING CORPORATION

MIDLAND, MICHIGAN

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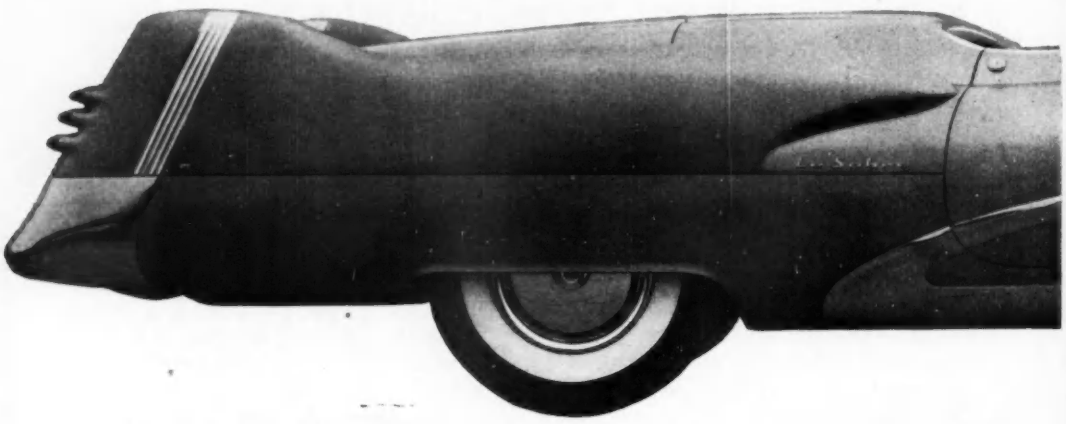
MOBILE PROVING GROUND

Le Sabre

. . . General Motors' laboratory on wheels pretests light-metal features for the car of the future



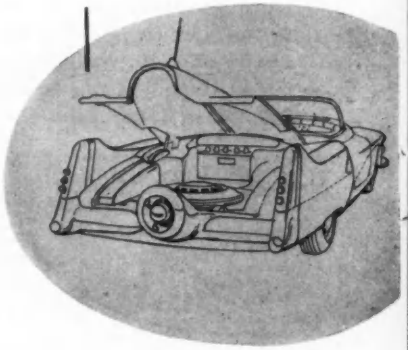
What you see is a rocket-sleek experimental car . . . revolutionary in its design. But "Le Sabre" is more than that. It's a sort of mobile proving ground . . . the practical GM way of testing scores of new ideas years ahead of production.

As engine power increases, the 10-to-1 compression ratio of Le Sabre's aluminum V-8 supercharged engine will have helped to pioneer the way. As car weight is reduced, for greater efficiency, Le Sabre's body—of smoothly-formed Alcoa Aluminum Sheet and Alcoa Magnesium Castings—will have tested light weight, proved it practical.

Thus General Motors creates a laboratory on wheels. And Alcoa men work shoulder to shoulder with GM engineers, to perfect the processes of forming, fabricating, assembling and finishing that bridge the gaps from experiment to mass production.

Doesn't this development suggest a larger role for light metals in your product? Military needs limit the metal we can supply now. But we *can* help you *imagineer* with aluminum and magnesium for future design improvements. Call your nearby Alcoa sales office. Or write ALUMINUM COMPANY OF AMERICA, 1841K Gulf Building, Pittsburgh 19, Pennsylvania.

REAR FENDERS AND SKIRTS are formed from aluminum alloy panels, heat-treated and aged in a manner similar to that used on the hood. Much of Le Sabre's strikingly beautiful grille work, decorative panels and general trim also were fabricated from Alcoa Aluminum.

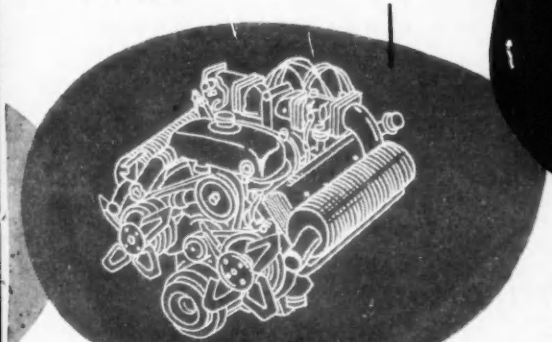


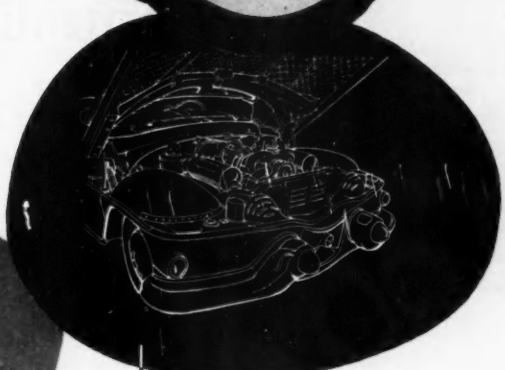
ALCOA

TAKE A LOOK AHEAD WITH THESE *LE SABRE* FEATURES!

GIANT 12-VOLT ELECTRIC PLANT powers the score of motors that serve Le Sabre's driver at a finger touch. Top, seat, concealed headlights, ventilation, deck lids, doors and built-in hydraulic jacks are among the motor-powered accessories it carries. Yet the car's total weight is less than many standard models of today . . .

WEIGHT IS SAVED in the engine by cylinder blocks, crankcase, cylinder heads and pistons of Alcoa Aluminum, as well as many other parts. Transmission case is an Alcoa Magnesium Casting. Burning high-octane gas and alcohol, the engine develops over 300 brake horsepower. Even the radiator core is Alcoa Aluminum.

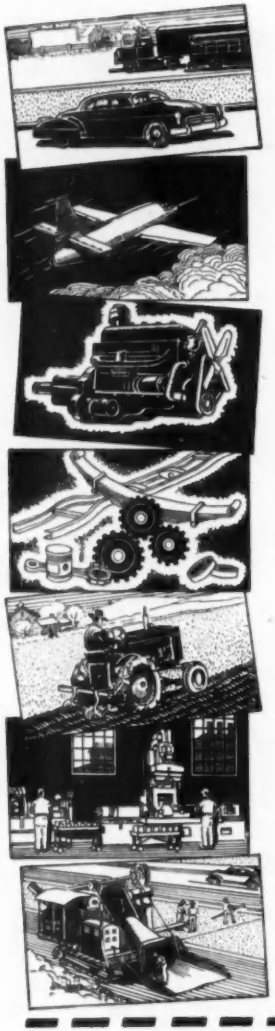




LE SABRE'S FLEET BODY uses Alcoa light metals from nose to tail. One-piece hood and front fender unit was made possible by 90" wide sheet rolled by Alcoa's Davenport mill. Inner door panels and rear decks are Alcoa Magnesium Castings; outer door panels are made of easily-formed Alcoa Aluminum Sheet.

first in **ALUMINUM**

ALCOA ALUMINUM ®



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Here are *facts* revealed by the Advertising Research Foundation Study* of the readership of AUTOMOTIVE INDUSTRIES:

Of individuals interviewed, 89% qualify as readers. There are 1.7 proved readers per copy of AUTOMOTIVE INDUSTRIES. 96% read the advertisements. 75% influence purchases. 81% of those influential in purchasing specify the brands and makes purchased. Pass-along readership is 66%.

Now add this *fact:* For five years running, the subscription renewal rate of AUTOMOTIVE INDUSTRIES has exceeded 80%, the best testimonial of real A.B.C. reader interest!

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* The $20,000 study made possible through the combined sponsorship and cooperation of the A.N.A., A.A.A.A., A.B.P., and the N.I.A.A. Survey work was conducted by Alderson & Sessions, Inc. of Philadelphia, under supervision of the Foundation.

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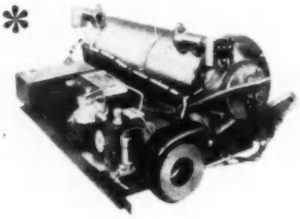
DISTRIBUTION AGE, the magazine that integrates all phases of distribution.

Here's one of the latest, fastest fire-fighting crash trucks manufactured for the USAF by American-LaFrance-Foamite Corp.—designed with under-body spray nozzles to permit effective fire-fighting under the most extreme conditions. Because *dependability beyond doubt* is demanded of every component, it is a tribute to Janitrol liquid heaters that they are *standard equipment.*

everything has to work!



When the alarm sounds, the crew on this crash truck wants to know that every component is ready to go and will stay on the job till it's done. Janitrol liquid heaters met specifications for engine coolant heating—to provide warm-up heating from —65°; as well as standby heat for engine, cab, defrosting, hose reel compartments; and auxiliary generator heat. In addition, the water supply in the main tank is protected from freezing by circulating through a heat exchanger installed in the engine coolant line . . . Look into Janitrol's long record of dependability under all conditions—in aircraft as well as ground vehicles—and you'll specify "Janitrol" for heat wherever and whenever needed.

HEAT WHEREVER YOU WANT IT

Janitrol

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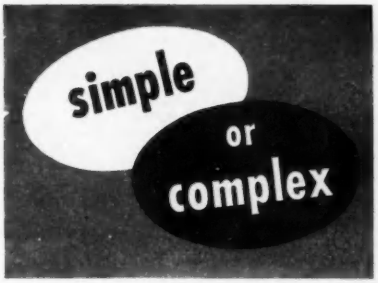


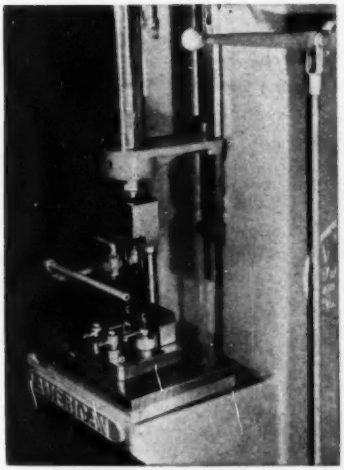
American - ENGINEERED

Broaching Fixtures CUT COSTS

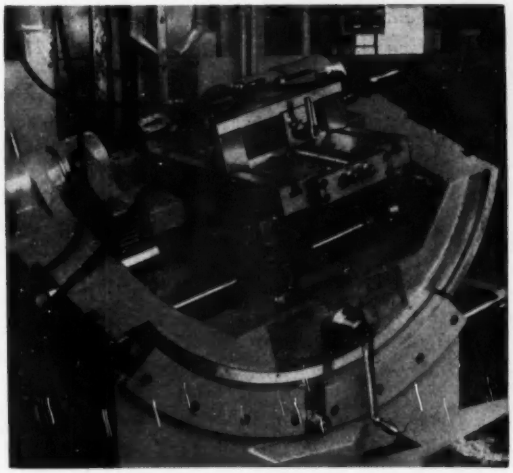
Efficient, economical production is the goal of broaching fixture design. Sometimes this goal is reached best with a simple fixture, designed for complete manual operation. At other times it means a highly complex fixture, engineered for multiple purposes, and equipped for automatic or semi-automatic operation.

The right fixture for your production needs probably lies somewhere between these two extremes. You can be sure of getting the right fixture . . . by having it designed and built by American engineers.

American offers you the advantage of over twenty-five years experience in the design and production of fixtures, broaches and broaching machines. This experience is your assurance of a fixture designed to do your job efficiently and economically. Write for their recommendations. Enclose a part print or sample, hourly requirements and type and model machine to be used. No obligation, of course. Address Dept. I.



This SIMPLE fixture helped one manufacturer cut costs by adapting an American V-1 two ton press to push down broaching of small motor connecting rods. Parts are located from the large hole and swung easily into position. The broaches are arranged to strip back through the work. A plate above the work prevents parts from lifting. An example of how an American-engineered fixture solved a broaching problem.



This COMPLEX fixture permits a milling cutter manufacturer to broach serrations in slots on different sizes of cutters. This versatile fixture permits tilting for helix and conical angles, and adjusting "in and out" as well as laterally to compensate for various sized milling cutters.

Write today for your copy of Catalog No. 450, 32 pages packed with useful, practical broaching information.

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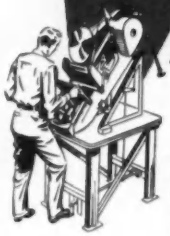

MARKEM helps make their names famous

Under these trade marks are made products ranging from nylons to aircraft. They include garments, hosiery, knit goods and textiles, radio and TV tubes, capacitors and resistors, vulcanizing equipment, cameras, pharmaceuticals, hand grenades, cartridges and canvas goods. All over the world, Markem methods, machines, type and inks are marking the products of industry.

There is a Markem method for almost every identification purpose. Markem Equipment is used for Marking on Products, Packages, Parts, or for producing Labels.

Submit *your* problem in detail with a sample of the item to be marked. Markem Machine Company, Keene 8, N. H.

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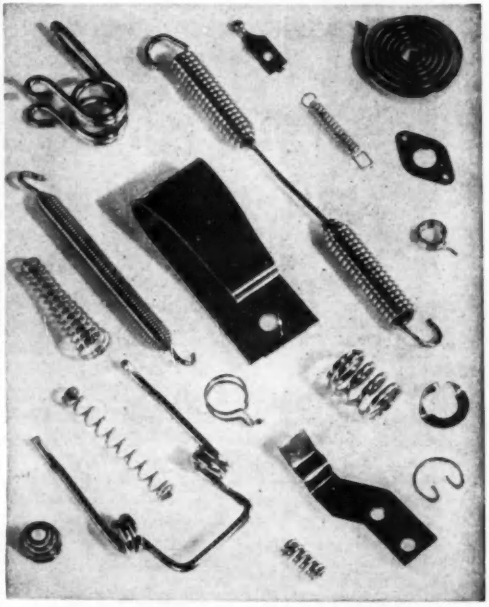
• We can help you bring production costs down by supplying you with springs and small parts engineered **exactly** to specifications. Our system of continuous inspection eliminates misfits—saves you valuable time on the assembly line. Whether you order springs in limited quantities or long production runs, each item receives the same expert attention.

Producing Clutch Pressure Springs
. . . Clutch Dampener Plate Springs



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CLEVELAND 5, OHIO

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300 PIECES PER HOUR

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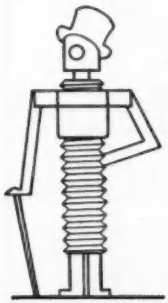

CHECK WITH CLEVELAND FIRST

If you need to perform any or all of these operations: Tapping...Threading . . . Drilling . . . Spot-facing . . . Reaming . . . Chamfering. Cleveland engineers can help you with your problem, show you how to effect economies in these operations.

Mr. Lead Screw says . . . Write for your copy of the Cleveland Production Tapping Guide and a copy of Catalog AT-6

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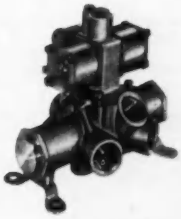
A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC.
CANTON 6, OHIO

AUTOMATIC CONTROL GENERAL CONTROLS

AL-580
Pressure Switch



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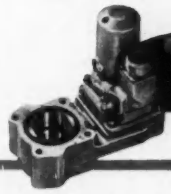

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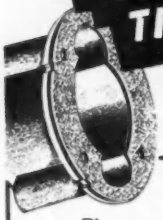

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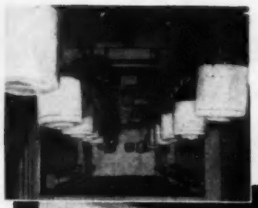

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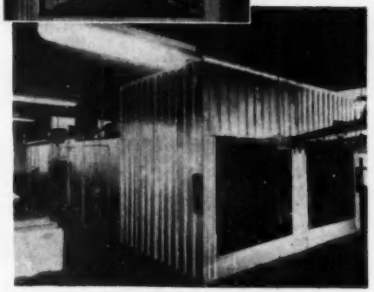

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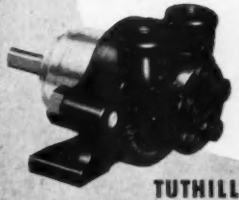

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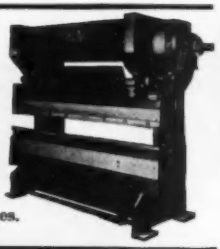
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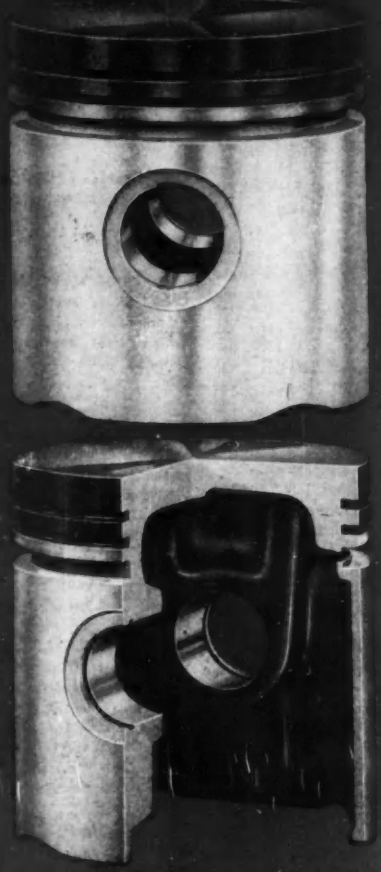

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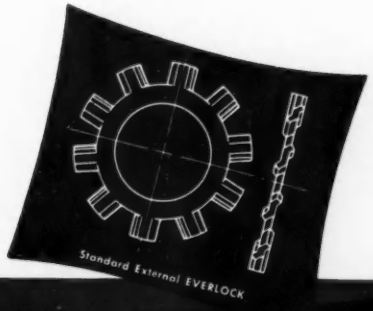
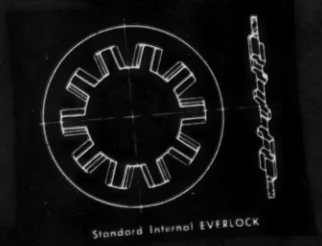
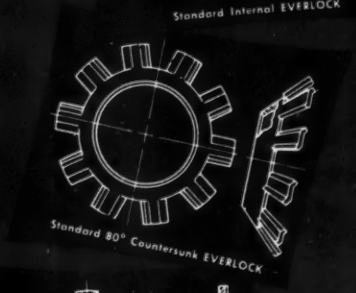
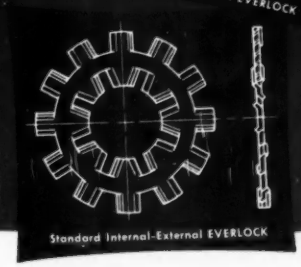
"CHISEL EDGE" LOCK WASHER

QUALITY









Safeguards your assemblies under vibration, expansion, contraction or strain

QUALITY of design and manufacture of Everlock Washers can be measured in only one way . . . the degree to which they safeguard the quality of the product you make. Only as long as they protect your assemblies against damaging vibration, expansion, contraction and strain . . . can their quality be termed "good."

FOR YEARS, engineers in industry and other leading manufacturers in almost every field have looked to Everlock to safeguard the quality of their products. Everlock's outstanding chisel edge design has set the standard for lock washers and has provided positive, lasting protection. Every standard type Everlock meets exacting lock washer needs.

BUT . . . if you need special types to fill a particular need, call on Everlock first. You'll get prompt service for all your washer needs . . . to your most demanding specifications.

When ordering screw-washer assemblies from screw manufacturers specify Everlock washers for quality and fast service.

WRITE TODAY FOR *New* 1951 CATALOG!

It's off the press! It's YOURS . . . FREE! It gives complete specifications on every **Everlock** *Washer. Find out now how* **Everlock** *can help you safeguard the quality of the product you make. Write for new 1951 catalog today.*

THOMPSON-BREMER & COMPANY, 1642 W. HUBBARD ST., CHICAGO 22, ILL.

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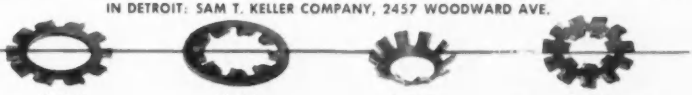
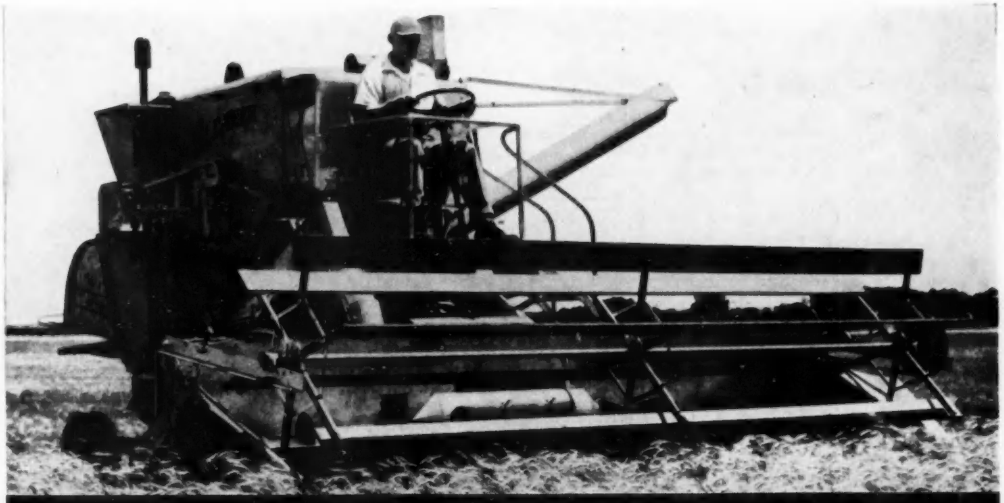
THERE'S AN **Everlock** LOCK WASHER FOR EVERY NEED

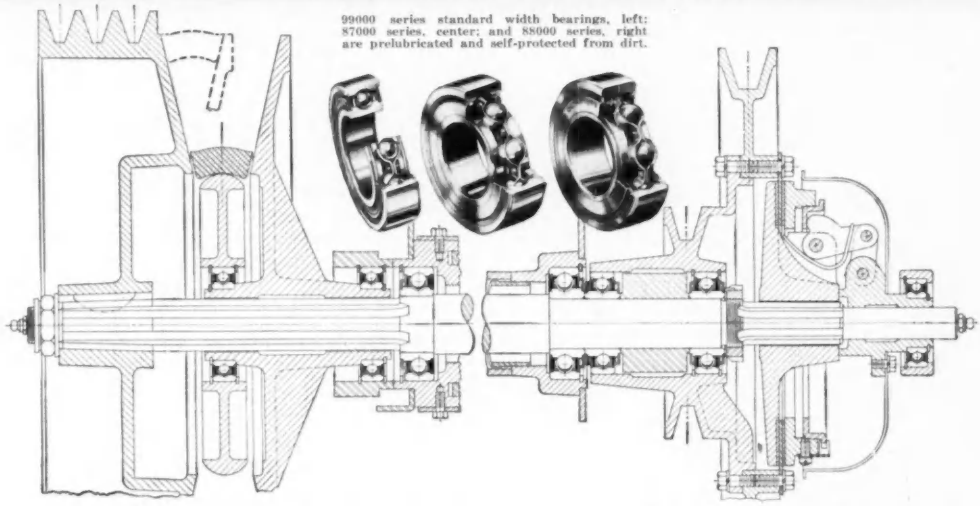


Standard External Everlock | Standard Internal Everlock | Standard 80° Countersunk Everlock | Standard Internal-External Everlock

the washer that has the edge



Bearings Have Their "Freedoms", Too!



99000 series standard width bearings, left; 87000 series, center; and 88000 series, right are prelubricated and self-protected from dirt.

● In the Gleaner Harvester Corporation's new 14 foot self-propelled combine, New Departure self-sealed and pre-lubricated ball bearings on the main clutch shaft feature several important "Freedoms". Prominent among these are freedom from **relubrication** — freedom from **adjustments** — freedom from servicing **time** — all of which add up to more freedom for the farmer — or more time for productive work, with equipment that stays cleaner, works better.

These sealed ball bearings are versatile, taking thrust or radial loads or both, in each self-contained unit. In the variable speed pulley and idler, on the main shaft, in the clutch release and clutch pulley positions, they simplify design — reduce drilling and tapping operations — give the builder freedom from the use of many small parts such as separate seals and closure caps — all adding up to a stronger, longer lasting machine for the farmer.

New Departure, Division of General Motors, Bristol, Connecticut

Nothing Rolls Like a Ball

NEW DEPARTURE BALL BEARINGS